NMED/DOE/AIP-96/2

NEW MEXICO ENVIRONMENT DEPARTMENT
DOE OVERSIGHT BUREAU
WASTE ISOLATION PILOT PLANT
ENVIRONMENTAL SURVEILLANCE
REPORT 1995

GROUND WATER
SURFACE WATER
SOIL
SEDIMENT
BIOTA

NMED/DOE/AIP-96/2

STATE OF NEW MEXICO
ENVIRONMENT DEPARTMENT
DOE OVERSIGHT BUREAU
WASTE ISOLATION PILOT PLANT
P. O. BOX 3090
CARLSBAD, NEW MEXICO 88221

JULY 1996

NMED/DOE OVERSIGHT BUREAU WASTE ISOLATION PILOT PLANT ENVIRONMENTAL SURVEILLANCE REPORT 1995

GROUNDWATER
SURFACE WATER
SOIL
SEDIMENT
BIOTA

NMED/DOE/AIP- 96/2

Preparer

Pat W. McCasland
Water Resource Specialist III

STATE OF NEW MEXICO
ENVIRONMENT DEPARTMENT
DOE OVERSIGHT BUREAU
WASTE ISOLATION PILOT PLANT
P. O. BOX 3090
CARLSBAD, NEW MEXICO 88221

JULY 1996

CONTENTS

ACRONYMS

AIP	Environmental Oversight and Monitoring Agreement Between the U.S. Department of Energy and the State of New Mexico, October 22, 1990
ASME	The American Society of Mechanical Engineers
ANSI	American National Standards Institute
CAO	Carlsbad Area Office of the DOE
CH	Contact Handled TRU-waste
DOE/OB	New Mexico Environment Department DOE Oversight Bureau
DOE	U.S. Department of Energy
EMOP	1995 NMED/WIPP Environmental Monitoring and Oversight Plan
EMP	WIPP Environmental Monitoring Plan, DOE/WIPP 94-024
EPA	U.S. Environmental Protection Agency
FW	Facility West sample location
HBRL	Health Based Regulatory Limit
INT	Indian Tank sample location
ITRI	Inhalation Toxicology Research Institute
LAL	Lower Action Level
LANL	Los Alamos National Laboratory
MDA	Minimum Detectable Activity
MCL	Maximum Contaminant Level
MDL	Minimum Detection Limit or Minimum Detectable Level
NMED	State of New Mexico Environment Department
NQA	Nuclear Quality Assurance
NW-1	Northwest-1 Ecological monitoring plot WIPP site sample location
QAMS	Quality Assurance Management Staff of the EPA Office of Research and Development, Office of Monitoring Systems and Quality Assurance
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RH	Remote Handled TRU-waste
SECS	Southeast Control Surface sample location
SNLA	Sandia National Laboratory Albuquerque
TCLP	Toxicity Characteristic Leaching Procedure
TRU-waste	Radioactive waste with greater than 100 nano-curies/gram of transuranic radionuclides, sometimes referred to as TRU - mixed waste if containing hazardous wastes.
UAL	Upper Action Level
WEED	WIPP East East Deep sample location
WIN	WIPP site raw water influent sample location
WIPP	Waste Isolation Pilot Plant
WSSI	WIPP South South Intermediate sample location

1.0 EXECUTIVE SUMMARY

The New Mexico Environment Department (NMED), under authority granted by the "Environmental Oversight and Monitoring Agreement Between the U.S. Department of Energy (DOE) and the State of New Mexico, 1995", conducts an independent environmental monitoring and oversight program at the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. The program is managed by the NMED DOE Oversight Bureau.

This report summarizes NMED data from the 1995 sample year (January - December 1995) and compares the NMED data set with the WIPP radiological and non-radiological environmental baseline concentration ranges published by DOE/WIPP for Biotic Tissue, Ground Water, Surface Water, Soil, and Sediment. Sufficient WIPP baseline sample size (n) exists for Surface Water, Ground Water, Sediment, and Soil. For Biotic Tissue, i.e., rabbit, quail, fish, and beef, however, there are only 1 or 2 analyses, which does not provide for calculation of statistical parameters and distributions.

In summary, data collected in 1995 by NMED are consistent with the WIPP radiological baseline and the background ground water characterization ranges. The report notes a few instances where the calculated Upper Action Level (UAL) is exceeded. By employing control charts (Appendix II) to graphically depict variations/exceedances at the 95% confidence interval, this report concludes that the WIPP baseline summaries appropriately define the environmental mean concentrations of the major radionuclides and ground water concentrations of major cations and trace metals, with only a few minor exceptions. The report also concludes that the nominal environmental concentrations of nuclides and typical non-radiological ground water chemistries present in the vicinity of the WIPP have not changed to any great extent since when the WIPP baseline information was generated in 1985 through 1988.

As would be expected with a facility which has not yet received any wastes, the report notes that here were no observed exceedances of reference regulatory standards in either the NMED or DOE/WIPP data sets.

The report recommends that, prior to waste emplacement, DOE/WIPP take advantage of the additional and more contemporary pre-operational information, supported by lower radiological detection capabilities (refer to Section 4.3), to revise and enhance the existing radiological baseline or develop a companion baseline for the most recent monitoring/surveillance years. The following are additional specific recommendations contained within the report:

1.) Include ^{241}Am in the radiological baseline summary for Ground Water, Surface Water, Sediment, and Biotic Tissue.

2.) Develop and establish investigatory thresholds such as the Upper Action Level and the Health Base Regulatory Limit by media for each nuclide. These should be in place before the commencement of operations.

3.) Investigate the baseline UAL exceedances of $^{233/234}$U (Surface Water and Soil), ^{235}U and ^{238}U(Vegetation, Sediment, Surface Water, and Soil), and ^{90}Sr (Ground Water). Refer to 5.6 Radiological Exceedance Matrix.

4.) Expand the analytical suite for WQSP wells 1-6a to verify that the wells were not inadvertently contaminated during drilling and completion and for future reference if they are intended for use as RCRA ground water compliance sample locations. Appendix IX constituents should be completed for each well.

5.) Develop and implement a comprehensive data analysis program in accordance with the WIPP Environmental Monitoring Plan (DOE/WIPP 94-024).

6.) Include the West Retention Basin (NMED 1995 - Facility West sample location) as a radiological baseline sample location for surface water and sediment.

7.) Establish the specific activity baseline range for $^{233/234}U$ to accommodate contemporary analytical reporting protocols, as opposed to reporting separate baseline ranges for ^{233}U and ^{234}U.

2.0 INTRODUCTION

Through the 1995 "Environmental Oversight and Monitoring Agreement Between the U.S. Department of Energy (DOE) and the State of New Mexico, 1995", the State of New Mexico has been authorized to implement site specific independent environmental monitoring and oversight programs at the DOE facilities located in New Mexico, i.e., Sandia National Laboratory, the Inhalation Toxicology Research Institute, Los Alamos National Laboratory, and the Waste Isolation Pilot Plant (WIPP). The purpose of the agreement is: "...to help assure that activities at DOE facilities are protective of the public health, safety and the environment. Such assurance will be accomplished through assessment of DOE's compliance with applicable laws, including rules, regulations, and standards; prioritization of cleanup and compliance activities; and a vigorous program of independent monitoring and oversight by the State of New Mexico." The agreement is administered by the State through the New Mexico Environment Department (NMED) DOE Oversight Bureau and provides support to personnel located at each facility. The agreement is one of a series of such agreements with states collectively known as "Agreements in Principle", the result of the 1988 DOE "cooperation and openness" initiative providing for independent environmental oversight at DOEs' nuclear defense, production, and research facilities while maintaining national security.

Oversight personnel have been at the WIPP site since July 1991, actively participating in environmental monitoring activities as observers, as well as, collecting split and co-located environmental samples and conducting independent monitoring activities and assessments. The independent environmental monitoring activities conducted by NMED/WIPP personnel are governed by the Site Specific Protocol for Implementation of the Environmental Oversight and Monitoring Agreement for the Waste Isolation Pilot Plant, April, 1996; the New Mexico Environment Department Site Specific Work Plan for the Waste Isolation Pilot Plant, 1996; and the New Mexico Environment Department Waste Isolation Pilot Plant Site Specific Health and Safety Plan, November 1992. Each of these plans were developed by NMED/WIPP to facilitate

the oversight role of NMED under the Agreement. The Site Protocol describes general roles and interface responsibilities of both agencies, the Work Plan defines general work scope, and the Health and Safety Plan provides for safe work consistent with the WIPP site safety program, as well as, the higher tiered NMED Health and Safety program. The draft 1995 NMED/WIPP Environmental Monitoring and Oversight Plan, NMED/WIPP 95-001(EMOP), references the Site Protocol, the Health and Safety Plan, and adds detail to the general work scope introduced in the Work Plan, i.e., sample locations, sample dates, specific quality assurance protocols, sample collection and handling procedures, data management, reporting, and prescribes analytical suites. Revisions are made annually to accommodate changes in the annual WIPP site environmental sampling schedule and proposed analytical suites.

This report summarizes results of NMED independent monitoring activities during the 1995 sampling year (January - December 1995) and provides specific observations regarding significant changes relative to the established WIPP environmental background concentrations for biotic tissue, ground water, surface water, soil, and sediment. NMED evaluation of the DOE/WIPP airborne particulate and effluent monitoring programs and the meteorological monitoring program will be provided in a subsequent report. Recommendations are offered to improve the current WIPP environmental monitoring program. All data generated by NMED/WIPP for the respective environmental media in 1995 are provided as tables in Appendix I and graphs are provided as Appendix II to illustrate the relationship of the NMED 1995 sample year data to the WIPP background concentration ranges, as well as, the health based thresholds. The DOE/WIPP radiological background information for all environmental media is published in the **Statistical Summary of the Radiological Baseline for the Waste Isolation Pilot Plant, DOE/WIPP 92-037, March 1992** and for non-radiological ground water background characterization, the **Background Water Quality Characterization Report for the Waste Isolation Pilot Plant, DOE/WIPP 92-013, June 1992.** Both documents are as Appendices 1 and 4, respectively, in the **Waste Isolation Pilot Plant Site Environmental Report for Calendar Year 1991, DOE/WIPP 92-007.**

3.0 FACILITY DESCRIPTION

The Waste Isolation Pilot Plant is an Energy Department facility located approximately 42 km (26 miles) east of Carlsbad, New Mexico (Appendix IV-Figure 1) and is the proposed disposal site for TRU-mixed waste (hazardous waste contaminated with transuranic radionuclides) generated by the nation's defense industry. Waste will be transported to the WIPP via truck and emplaced in the mined repository 655 meters (2150 feet) below the surface within a roughly 600 meter (2,000 feet) thick evaporite (salt) sequence, known as the Salado Formation. The total volume of TRU-mixed waste may not exceed 6.2 million cubic feet and the estimated specific activity of the total repository inventory is 5.7 million Curies (WIPP Transuranic Waste Baseline Inventory Report, Revision 1, CAO-94-1005). Surface facilities are situated on flat to gently rolling hills known as the Los Medanos in Southeastern New Mexico and is characteristic of the Upper Chihuahuan desert biome. Currently, the facility is seeking a certification of compliance with 40 CFR 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes" from the U.S. Environmental Protection Agency (EPA)and a Resource Conservation and Recovery Act, 40 CFR 264, (RCRA) disposal permit from the State of New Mexico. DOE WIPP has also petitioned the EPA to grant a No-Migration Determination in accordance with 40 CFR 268.6. No TRU-mixed waste has been emplaced in the WIPP.

4.0 1995 DATA EVALUATION

This evaluation focuses primarily on determining whether the 1995 NMED data differ significantly from the environmental background concentration ranges published for the WIPP site environs. NMED data is supported with quality assurance protocols set forth in the draft DOE-OB Standard Operating Procedures, which addresses sampling and analytical protocols, and is referenced in the NMED/WIPP Site Specific Work Plan and the draft NMED/WIPP Environmental Monitoring and Oversight Plan.

4.1 DATA QUALITY and COMPARABILITY

NMED 1995 data is derived from analysis of split DOE/WIPP samples or as co-located samples (collected alongside DOE/WIPP). This provides the necessary initial relationship (temporal and spatial) between data generated by the two agencies. Comparability is also subject to data quality, therefore NMED/WIPP has implemented similar quality assurance protocols and guidance employed by DOE/WIPP that govern sample handling and analytical quality controls. The contracting radioanalytical laboratories used by the NMED in 1995 participated in the DOE Environmental Measurements Laboratory (EML) Interlaboratory comparison program. The EML report, EML-569 July 1995, reports acceptable analysis of the nuclides in the various environmental matrixes and indicates a well controlled laboratory analytical system or process during the period in which the 1995 NMED data was produced.

DOE/WIPP complies with guidance provided by "Quality Assurance Program Requirements for Nuclear Facilities", ASME NQA-1, and is in the process of developing Quality Assurance Project Plans consistent with "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans", EPA QAMS-005/80.

4.2 DATA COMPARISON

When appropriate, control charts or graphs are used to visually compare NMED 1995 data to the established DOE/WIPP baseline/background concentration ranges and the Upper Action Levels. Where sufficient NMED data exists and similar locations can be statistically summarized, a mean and standard deviation is calculated. Statistical comparison of the DOE and NMED data sets will be performed in the future when more data become available.

4.3 MINIMUM DETECTABLE ACTIVITY

The American National Standards Institute (ANSI) has proposed, ANSI N42.23, "Measurement and Associated Instrumentation Quality Assurance for Radioassay Laboratories," September 10, 1995, which states; "The Minimum Detectable Concentration (Minimum Detectable Activity [MDA] expressed in concentration units), by definition, is a concept that addresses the capabilities of a measurement process under a given set of nominal experimental conditions" and describes the proper uses of the *a priori* MDC (before the individual measurement) as;

a. Comparing different measurement techniques or alternative implementations of a given technique (under the stated nominal conditions);
b. Determining whether a proposed measurement method is appropriate for a given set of sample characteristics (including estimates of the nominal levels of interferences anticipated in the batch) and client expectations; and
c. Judging whether certain regulatory limits are satisfied by the proposed measurement process as applied to a batch of sample measurements.

The standard also cautions against using the *a priori* MDC to:

a. Compare the results of an individual sample measurement to the MDC (MDA expressed in

concentration units) in order to assess the "worth" or "accuracy" of the measured value;

b. Determine a "sample specific MDC"; and

c. Censor the results of an individual measurement due to its being "less than MDC."

According to the standard, the best interpretation of individual measurements lies in the estimate of total propagated uncertainty bounds for each result and that the estimated confidence interval is the best information available for that measurement. The Statistical Summary of the Radiological Baseline for the Waste Isolation Pilot Plant, DOE/WIPP 92-037, March 1992, summarizes the baseline environmental information gathered during the period from 1985 to 1988 and reports for each nuclide: the mean concentration value, associated standard deviation, and standard error (estimated as the standard deviation divided by the square root of the sample size, and is by definition, the maximum likelihood estimator of the standard deviation of the mean), as well as, the process MDA. Concentrations of the naturally occurring nuclides or those deposited as a result of worldwide fallout are expected to be nominal in the WIPP environs and on occasion negative measurements do occur. While not a physical reality, this can be expected if the environmental concentration of the nuclide approaches zero, e.g., an analyte with a mean concentration of zero would have a normal distribution consisting of 50% negative values and 50% positive values. For example ^{3}H and ^{237}Np are consistently reported as negative in the WIPP baseline and along with ^{244}Cm, were not analyzed in 1995. It should also be understood, that the standard deviation is a measure of precision and is a function of the concentration of analyte; i.e., as the absolute concentration approaches the limit of detection, precision deteriorates, therefore, the lower the process MDA the more credible the results.
The graphs presented in Appendix II illustrate the respective 1995 NMED and WIPP Baseline mean values, the associated upper and lower 95% confidence intervals, i.e., plus and minus two standard deviations, respectively, and the specific process MDA.

The following exercise compares the reported radioanalytical process capabilities (MDA/MDL) of the respective agencies and is not intended to qualify data based on whether or not it was reported above the process MDA/MDL. Table 4.3a lists the nuclides reported above the process

MDA by the NMED in 1995 but reported below the MDL by the WIPP Baseline.

Table 4.3a

Radionuclides reported above the MDA by NMED in 1995

BIOTIC TISSUE		SURFACE WATER	
Vegetation-NW1	Pecos River Catfish	Pecos River Locations	Tanks Locations
Am-241*	Th-228	Am-241(UPP only)*	Am-241(INT only)*
U-233/34	U-233/34	Pu-241	Sr-90
U-238	U-238	Ra-226(UPP&CBD only)	Th-228
		Th-228	Th-230
		Th-230(UPP only)	Th-232
		Th-232(UPP only)	U-235
			U-238
SEDIMENT		GROUNDWATER	SOIL
Pecos River Locations	Tanks	All Locations	All locations
Am-241(CBD&PCN only)*	Pu-241(INT)	Sr-90	U-235
Cs-137(CBD&UPP only)	Th-230		
Pu-241(CBD&PCN)	Th-232		
Th-230			
Th-232			

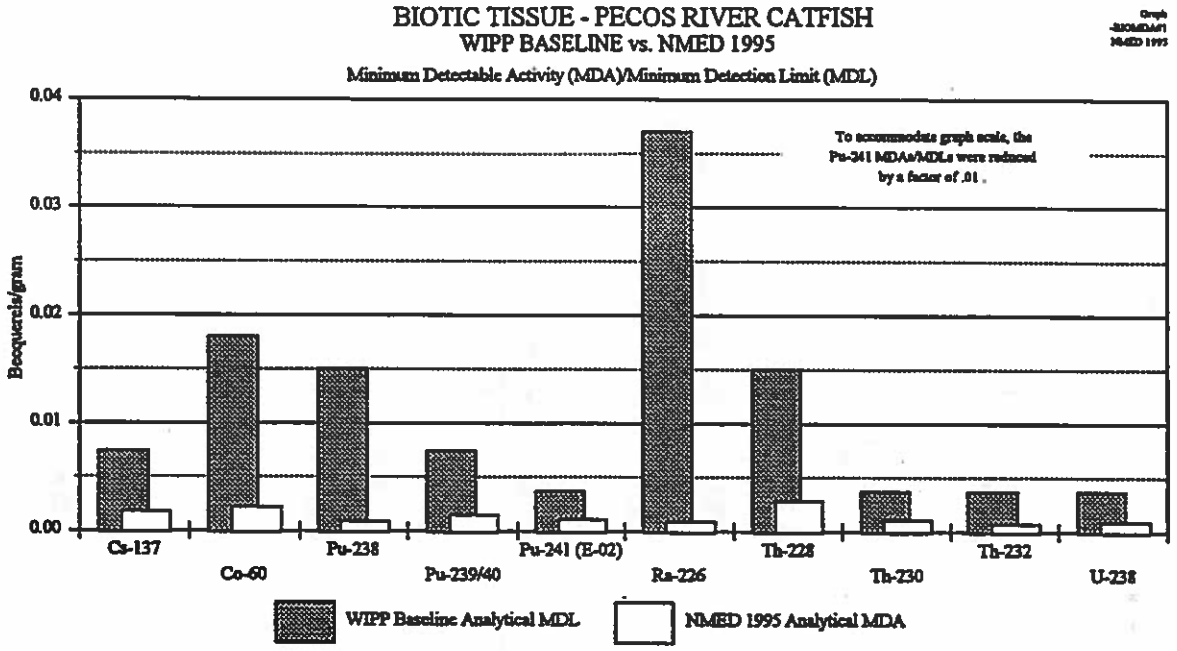
The WIPP Baseline Summary document does not report the environmental concentration of Am-241 in Biotic Tissue, Surface Water, Sediment, or Groundwater.

* Am-241 was detected above the Minimum Detectable Activity in this environmental medium by NMED in 1995.

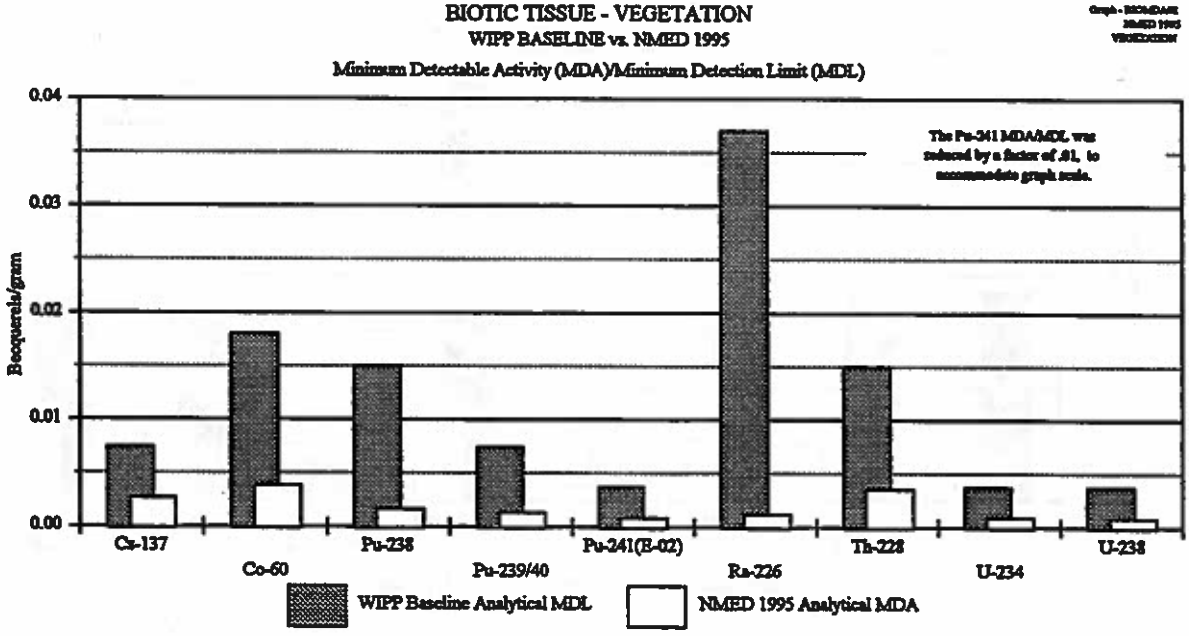
UPP - Upriver Pecos Control Location CBD - Carlsbad Pecos River Location INT - Indian Tank Location PCN - Pierce Canyon Location

While it appears that the analytical technologies have improved considerably since compilation of the baseline, an objective conclusion would necessitate review and comparison of all process variables and algorithms employed by the laboratories in determining the respective MDAs/MDLs. Nonetheless, data derived from an analytical process or system with a lower MDA/MDL can be considered more reliable (higher degree of confidence) than that from a process or system with a higher MDA/MDL. Graphs 4.3b-4.3g illustrate the MDLs/MDAs reported by the WIPP Baseline (1985-1988) and the NMED in 1995, in most cases, those achieved by NMED are lower than the WIPP Baseline. Interestingly, when comparing the individual concentration range values of the two sets of environmental data, as illustrated in Appendix II, we see only minor variations and is generally confirmatory of the WIPP Baseline range concentrations. A preliminary review of the 1995 WIPP environmental data indicates MDAs similar to those achieved by NMED in 1995.

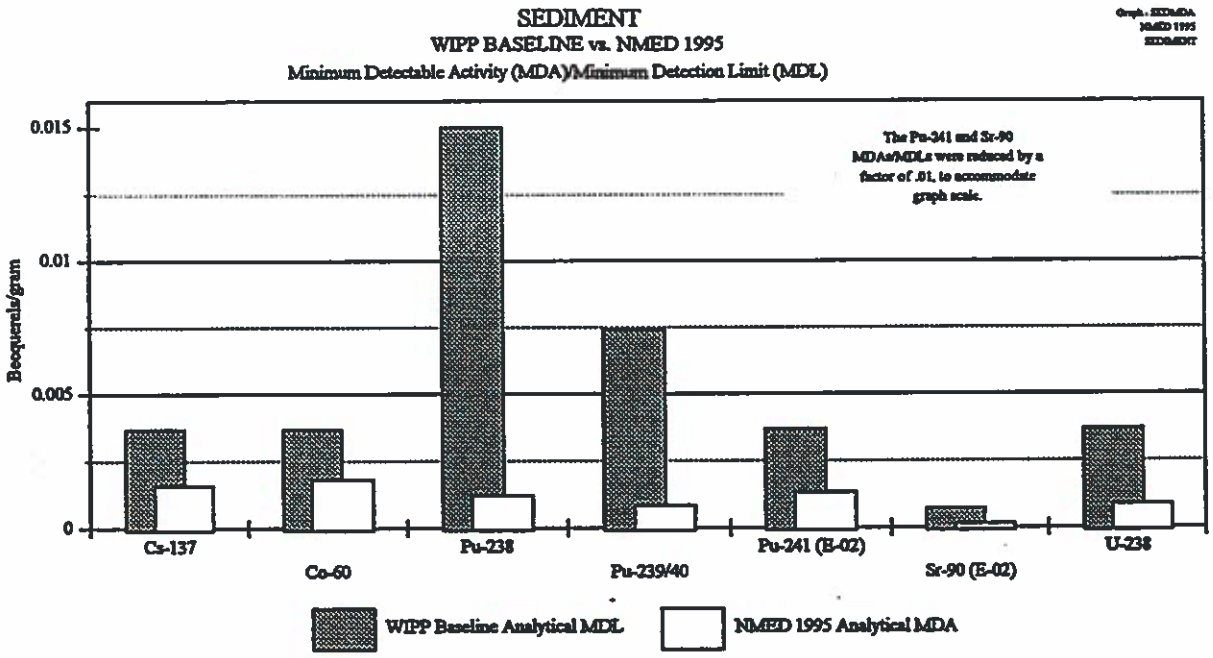
Graph 4.3b



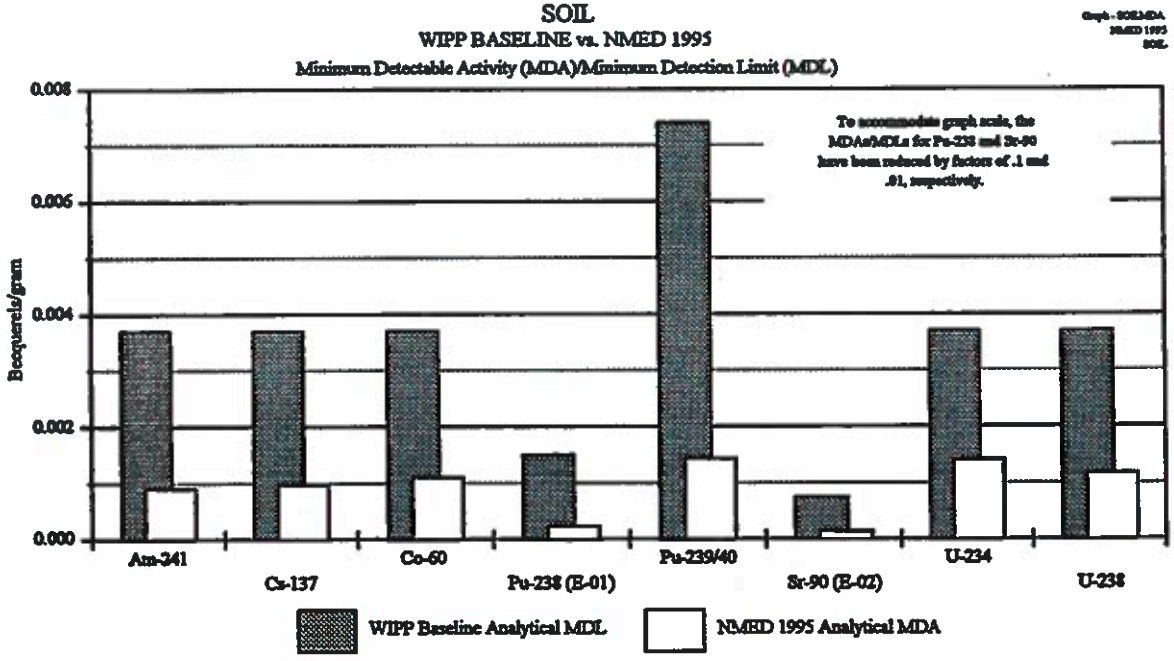
Graph 4.3c



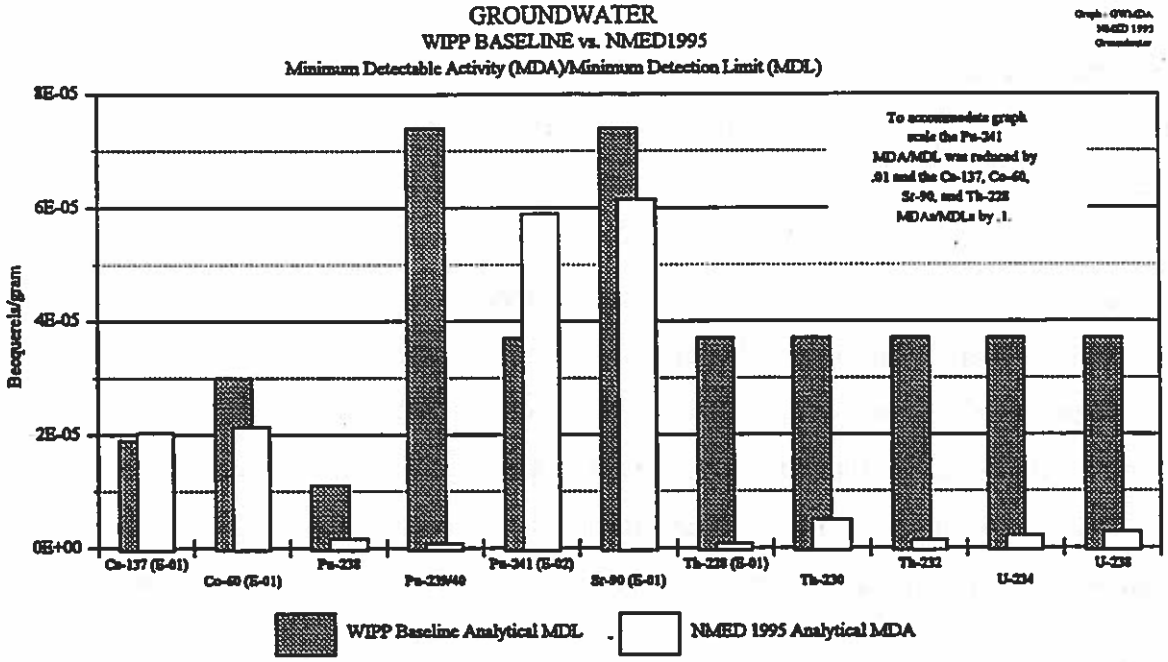
Graph 4.3d



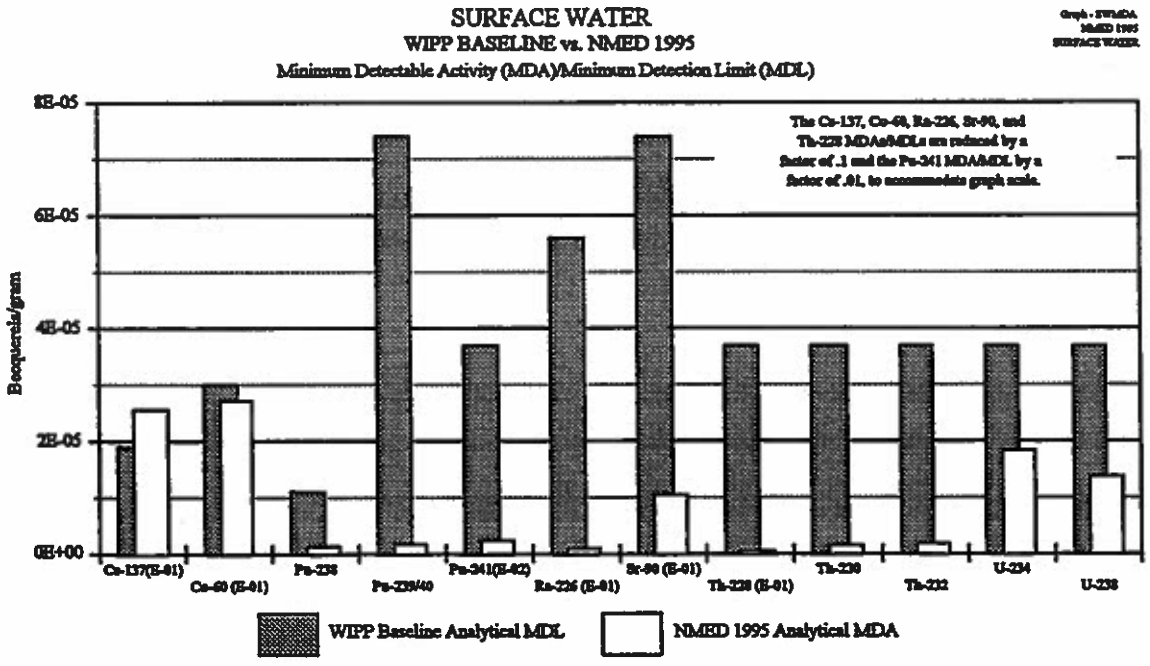
Graph 4.3e



Graph 4.3f



Graph 4.3g



4.4 FIELD PROJECT REPORTS

Event specific Field Project Reports (FPRs) are initiated prior to any planned surveillance and prescribes necessary pre-event preparations, i.e., identifies analytical suites and required minimum detection limits, notification of contract laboratory, sample kit needs, identifies hazards, and describes overall objectives. Following the event, the FPR is updated with a narrative based on field notes of sampling conditions and unusual occurrences. After the data is received from the contracting laboratory and reviewed, a final evaluation is performed which completes the report. These reports are archived with other FPRs for the respective sample year for future reference. To provide the necessary administrative, as well as, technical control of sampling event activities, the Project Leader and Field Team Leader sign a sign-off sheet to ensure adequate control of resources and to ensure that objectives are satisfied. Following is a copy of the FPR sign-off sheet and a list of attachments.

FIELD PROJECT REPORT

NMED DOE Oversight (AIP) Bureau - WIPP TRACKING SHEET: January - December 1996

PROJECT TITLE (Sample Location) / NUMBER: _____

NMED WIPP FIELD TEAM LEADER: _____ PROJECT START DATE: _____

MEDIA (✔) : Ground Water__ Surface Water__ Air__ Soil__ Sediment__ Other_____

CATEGORY (✔) : Environmental Monitoring_____ Environmental Restoration_____ Waste Management/Characterization_____

TYPE OF ACTIVITY (✔) : Observational____ Environmental Sampling____ Other_____

Whenever possible, prior to initiation of the field activities, parts 1. & 2. will be completed and filed.

1. **Project Work Guide**: Prior to field sampling/observation initial trip, the Field Team Leader (FTL) or designee prepares a Project Work Guide which shall include three main sections; Introduction, Site History with location map, and Sampling Objectives and Goals.

2. **Health and Safety Protocols**: Prior to field sampling/observation, the FTL will provide all necessary NMED and DOE/WIPP health and safety sign-off documentation to the individual serving as the zone or activity safety manager. Access to any sampling or observational locations will be governed by the NMED Site Specific Health and Safety Plan which acknowledges protocols and procedures set forth in WIPP Procedure WP12-1, the WIPP Safety Manual. NMED-AIP Program Manager and DOE/WIPP must pre-approve access/entry into any exclusionary zone requiring PPE above modified Level D, e.g., Level C.

   NMED-WIPP Project Leader (signature) : _____

   Date parts 1. & 2. completed and filed : _____

3. **Field Observations, Copy of initial Chain-of-Custody**

   NMED-WIPP Project Leader (signature) : _____

   Date part 3. completed and filed : _____

4. **Signed-off copy of the Chain-of-Custody from Laboratory**

   NMED-WIPP Project Leader (signature) : _____

   Date part 4. completed and filed : _____

5. **Copy of Laboratory Invoice (Original to NMED-AIP Financial Specialist)**

   NMED-WIPP Project Leader (signature) : _____

   Date part 5. completed and filed : _____

6. **Information Data Request Form submitted to DOE**

   NMED-WIPP Project Leader (signature) : _____

   Date part 6. completed and filed : _____

7. **NMED Data Received**

   NMED-WIPP Project Leader (signature) : _____

   Date part 7. completed and filed : _____

8. **DOE Data Received**

   NMED-WIPP Project Leader (signature) : _____

   Date part 8. completed and filed: _____

9. **Data Analysis and Recommendations**

   NMED-WIPP Project Leader (signature) : _____

   Date part 9. completed and filed : _____

LIST OF ATTACHMENTS

The following list of attachments must accompany the Field Project Report before it will be considered final.

1. Project Work Guide ..... ☐
   - 1a. Summaries of historical DOE, EEG, NMED, etc., data, if applicable ..... ☐
     ☐ Radionuclides ☐ General Chemistry ☐ Metals ☐ Volatile Organics
     ☐ Base/Neutral Extractibles ☐ PCBs ☐ Historical Water Level Measurements
   - 1b. Location Map ..... ☐
   - 1c. Hazard Evaluation Plan ..... ☐
   - 1d. Job Hazard Analysis ..... ☐
2. Field observation notes ..... ☐
3. Field Sampling log ..... ☐
4. Copy of Chain-of-Custody form showing NMED receipt of split sample(s) from DOE . ☐
5. Copy of Request for Analysis and Chain-of-Custody form submitted by NMED to laboratory ..... ☐
6. Copy of signed-off copy of the Chain-of-Custody from the laboratory ..... ☐
7. Copy of Invoice from the laboratory ..... ☐
8. Copy of Information Data Request Form submitted to DOE ..... ☐
9. Copy of NMED analytical results ..... ☐
10. Copy of DOE analytical results ..... ☐
11. Original Data Evaluation Report stating quality of DOE data ..... ☐

4.5 ACTION LEVELS

At a meeting between the NMED/DOE-Oversight Bureau/WIPP, Environmental Evaluation Group (EEG), Carlsbad Environmental Monitoring and Research Center (CEMRC), Westinghouse Waste Isolation Division (WIPP Managing and Operating Contractor) and the DOE/Carlsbad Area Office (CAO) a consensus was reached that reports on environmental surveillance at the WIPP site should illustrate the relationship between current year data and historical background /baseline ranges, as well as comparison of DOE OB surveillance measurements to nuclide specific derived concentration guides. Measurements taken before waste is deposited into WIPP is used for baseline measurements and will not be useful for surveillance of DOE activity impacts (if any) until waste begins to be managed at the site.

Federal and state agencies provide regulatory standards for public dose limits from radioactive constituents in air and water but no such standards exist for soil, sediments, and foodstuff. Guidelines limiting radiation exposure to the public from DOE operations are provided by directives from DOE and include limits for air, water, soil, sediment and foodstuff. These directives are contained in DOE Orders 5400.1 "General Environmental Program", 5400.5 "Radiation Protection of the Public and the Environment", 5480.1 "Environmental Protection, Safety and Health Protection Standards", 5484.1"Environmental Radiation Protection, Safety, and Health Protection Information Reporting Requirements," Chap III "Effluent and Environment Monitoring Program Requirements"

The U.S. Environmental Protection Agency and New Mexico Environment Department limit the radiation dose from facility activities to the public through air pathways to an Estimated Dose Equivalent (EDE) of 10 mrem/yr and from drinking water to an EDE of 4 mrem/yr. Doses from all other pathways are limited by DOE's EDE limit of 100 mrem/yr. An Estimated Dose Equivalent is the hypothetical whole-body dose or sum of the individual body organ doses, weighted to account for the sensitivity of each organ to radiation-induced damage. These factors also account for intake pathways, length of time in the body and physical properties of each radionuclide. Maximum concentrations of individual radionuclides including internal and external radiation are derived from these Public Dose Limits (PDLs) and weighting factors based on recommendations from the International Commission on Radiological Protection and the National Council on Radiation Protection and Measurements. These Derived Concentration Guides (DCGs) for Water and Derived Air Concentrations (DACs) for a few selected radionuclides are found on Table A. DOE's Derived Concentration Guides for Water and Derived Air Concentrations.

Table A. DOE's Derived Concentration Guides for Water and Derived Air Concentrations[a]

Nuclide	DCGs for Water In Uncontrolled Areas (μCi/mL)	DCGs for DrinkingWater Systems(μCi/mL)	DACs (μCi/mL) Uncontrolled Areas	Controlled Areas
^{3}H	2×10^{-3}	8×10^{-5}	1×10^{-7}	2×10^{-5}
^{7}Be	1×10^{-3}	4×10^{-5}	4×10^{-8}	8×10^{-6}
^{89}Sr	2×10^{-5}	8×10^{-7}	3×10^{-10}	6×10^{-8}
^{90}Sr[b]	1×10^{-6}	4×10^{-8}	9×10^{-12}	2×10^{-9}
^{137}Cs	3×10^{-6}	1.2×10^{-7}	4×10^{-10}	7×10^{-8}
^{234}U	5×10^{-7}	2×10^{-8}	9×10^{-14}	2×10^{-11}
^{235}U	6×10^{-7}	2.4×10^{-8}	1×10^{-13}	2×10^{-11}
^{238}U	6×10^{-7}	2.4×10^{-8}	1×10^{-13}	1×10^{-13}
^{238}Pu	4×10^{-8}	1.6×10^{-9}	3×10^{-14}	3×10^{-12}
^{239}Pu[b]	3×10^{-8}	1.2×10^{-9}	2×10^{-14}	2×10^{-12}
^{240}Pu	$3x\ 10^{-8}$	1.2×10^{-9}	2×10^{-14}	2×10^{-12}
^{241}Am	3×10^{-8}	1.2×10^{-9}	2×10^{-14}	2×10^{-12}
	(μg/L)	(μg/L)	(pg/m^3)	(pg/m^3)
Nat Ur	800	30	1×10^{5}	3×10^{7}

[a] Guides for uncontrolled areas are based on DOE's PDL for the general public; those for controlled areas are based on occupational RPSs for DOE Order 5480.11. Guides apply to concentrations in excess of those occuring naturally or that are due to worldwide fallout.

[b] Guides for ^{238}Pu and ^{90}Sr are the most appropriate to use for gross alpha and gross beta, respectively.

When waste management operations of WIPP begin, periodic measurements will be made for specific radionuclides for the different matrices, (i.e. air, water, soil, foodstuff). Doses can then be calculated from the measured concentrations and compared to the applicable public dose standards. Computer modeling programs such as RESRAD are available and applicable to calculating appropriate doses from concentrations measured by the surveillance activities at WIPP. Doses from DOE facility operations can then be graphically compared to standards or reported as percentages of the standards.

4.5.1 Radiological Upper and Lower Action Levels

For the purpose of this report, the radiological "Upper Action Level" (UAL) is the established DOE/WIPP baseline mean concentration plus two standard deviations (upper 95% confidence interval) and the "Lower Action Level" (LAL) is the established DOE/WIPP baseline mean concentration minus two standard deviations (lower 95% confidence interval). Values reported above the UAL or below the LAL could indicate a significant trend or more likely, given the nominal environmental concentrations, that the result was biased by sampling or analytical variables. With near zero mean concentrations, often times, the lower 95% confidence interval falls below zero (negative number) and can be expected. These baseline ranges characterize the unperturbed radiological environment within the WIPP site boundary (16 sections) as the WIPP has yet to receive waste. Nevertheless, DOE would be required to report, investigate and explain any UAL/LAL accedence.

4.5.2 Non-radiological Upper and Lower Action Level

For the purpose of this report, the non-radiological UAL and LAL are two standard deviations above and below the established WIPP background mean concentration, respectively, for a specific parameter.

4.5.3 Non-radiological Health Based Limits

The non-radiological Risk-Based Concentration (RBC) are taken from values listed in the **EPA Region III Risk-Based Concentration Table, October 4, 1995.** This table contains reference doses and carcinogenic potency slopes, as compiled by EPA Region III, from the most recent updates of IRIS, HEAST, the EPA-NCEA Superfund Health Risk Technical Support Center, and other EPA sources and is distributed semi-annually to all interested parties.

5.0 RADIOLOGICAL SURVEILLANCE

The various media were sampled as splits or co-located samples with WIPP. Comparisons of the 1995 NMED values or mean ranges were made utilizing the published WIPP baseline mean ranges at the 95% Confidence Interval. The Baseline reports ^{233}U and ^{234}U separately and because the ^{233}U values are small compared to ^{234}U values, NMED chose to compare it's $^{233/234}U$ values to the ^{234}U baseline concentration range values. A radiological UAL exceedance matrix is provided in subsection 5.6. In 1995, NMED contracted with two certified radioanalytical laboratories to provide sample analyses consistent with NMED/WIPP protocols. Each participate in the DOE/EML and EPA Interlaboratory Comparison Programs and have approved Quality Assurance and Quality Control Programs.

5.1 BIOTIC TISSUE

NMED observed collection of catfish, deer, rabbit, and vegetation at various times during 1995 and accepted split samples from WIPP environmental monitoring personnel. Only samples from the Pecos River Dixon Crossing catfish and NW1 vegetation were analyzed, all others have been archived and will be analyzed if DOE results indicate baseline divergence.

5.1.1 Biotic Tissue: Catfish (Pecos River Dixon's Crossing)

NMED participated with WIPP environmental monitoring staff during August 1995, to obtain samples of catfish samples from the Pecos River north of Carlsbad, New Mexico at Brantley Lake, considered a control location (deemed to be far enough away from the WIPP site as to be unaffected by WIPP activities) approximately 45 miles (72.4 km) northwest of WIPP, and south of Carlsbad at a location known as Dixon's Crossing approximately 18 miles (28.9 km) due west of the WIPP site. NMED analyzed only the Dixon's Crossing sample and archived the Brantley sample for future analysis if warranted, i.e., if DOE results are elevated. The catfish were obtained using trotlines and it should be noted that the largest specimen was just under three pounds with most being less than a pound. Each catfish was disemboweled and the head and tail

removed and discarded. This is typical when preparing catfish for human consumption and fairly estimates the exposure pathway to man. To provide split samples, each specimen was cut in half with each agency being provided an alternating but equal number of posterior and anterior sections. This seemed to be the best method of achieving a true split sample. Decontamination of the equipment occurred routinely with deionized water prior to splitting each specimen. Nominal concentrations are evident with ^{60}Co below the LAL. Refer to: Appendix I, table-Summary of 1995 Biotic Tissue Radiochemical Analytical Results; Appendix II, Graph BT-1; and Appendix IV, Figure 2.

5.1.2 Biotic Tissue: Vegetation (NW-1)

On August 9, 1995 NMED participated in collection of vegetation samples at the NW-1 ecological monitoring plot located 800 feet (244 meters) northwest of the Salt Handling Shaft. The starting point marker (center of plot) was used as the reference for random selection of collection locations within the plot. A rectangular, ½ inch PVC pipe quadrat, approximately 2' X 4', was lain on the ground to define the collection zone. Vegetation was clipped, split into two equal parcels, and placed in each agency's plastic bag. Bags were provided to the NMED by WIPP. Only current years growth was collected according to WIPP Procedure 02-310, however the species of plants sampled were not identified and recorded. Nominal concentrations are evident with ^{60}Co reported below the LAL and ^{235}U and ^{238}U detected above the UAL. Refer to: Appendix I, table-Summary of 1995 Biotic Tissue Radiochemical Analytical Results; Appendix II, Graph BT-2; and Appendix IV, Figure 3.

5.2 SEDIMENT

On June 27, 29, & 30, 1995 NMED accompanied WIPP personnel to the various sediment sample baseline locations to observe collection and receive split samples of the media. Sampling activities at each location were similar, i.e., events documented, equipment decontaminated with deionized water, and proper Personal Protective Equipment (PPE) was used (safety glasses and rubber

gloves). The samples were obtained using a Teflon shovel and each agency's container filled alternatingly with a large stainless steel spoon. Refer to: Appendix I, table -Summary of 1995 Sediment Radiochemistry Results (2 pages); Appendix III, graphs SED-1, SED-2, & SED-3; and Appendix IV, Figure 4.

5.2.1 Mean Concentrations of Pecos River Sample Locations (Brantley Lake, Carlsbad, Pierce Canyon, Upriver Pecos)

Nominal mean concentrations are evident with most isotopes and all are below the UAL.

5.2.2 Indian Tank

This basin is located 1 mile northwest of Project Gnome in section 28-T23S-R30E. On December 10, 1961 a 3.1 kiloton nuclear device was detonated 1,184ft (361m) below the surface at Project Gnome resulting in an unplanned release of radioactivity which inundated the land surface in the area of Indian Tank, nonetheless, nominal activities are reported for most nuclides. ^{235}U was reported at .0022 Bq/g which is less than the UAL of .00291 Bq/g and ^{238}U was reported at .0385 Bq/g, which is greater than the UAL of .0370 Bq/g.

5.3 SURFACE WATER

NMED observed collection of the NMED and WIPP surface water split samples on June 27, 28, 29, & 30, 1995 at the baseline locations where water was available. These samples were obtained coincidently with the sediment samples and similar sampling and handling protocols were followed by the WIPP. The Facility West location was sampled independently by the NMED and occurred following a storm event sufficient to fill the retention basin. Refer to: Appendix I, Summary of 1995 Surface Water Radiochemistry Results (3 pages); Appendix II, Graphs SW-1, SW-2, and SW-3; and Appendix IV, Figure 4.

5.3.1 Mean Concentration of the Pecos River Sample Locations (Brantley Lake, Carlsbad, Pierce Canyon, Upriver Pecos)

Nominal mean concentrations are evident. The ^{235}U concentration was above the UAL and the ^{238}U concentration was very near the UAL.

5.3.2 Indian Tank

Nominal concentrations are evident. The ^{235}U and ^{238}U concentrations both exceeded the UAL .

5.3.3 Site Influent as Surface Water

The WIPP site receives untreated water from Double Eagle Water System pipeline for domestic and fire suppression uses. The influent originates at a well field east of Maljamar, New Mexico which is approximately 42 miles (68 km) northeast of the WIPP site and is considered a Surface Water in the baseline summary. Nominal concentrations are evident. The ^{238}U concentration was detected above the UAL.

5.3.4 Facility West Surface Water

Nominal concentrations are evident with most isotopes reported below the reported MDA except ^{234}U and ^{238}U. The ^{235}U concentration exceeded the UAL. WIPP collected co-located samples but did not perform specific radionuclide analyses.

5.4 SOIL

NMED analyzed soil samples split with WIPP from three locations in 1995. Random locations were selected and samples collected using a stainless steel 15 X 15 X 10 centimeter square template that was pressed into the soil. Samples were taken from depth ranges of 0-2, 2-5, and 5-10 centimeters. The samples were split using a Humboldt model H3975 soil splitter. Refer to: Appendix I, Summary of 1995 Soil Radiochemistry Results; Appendix II, graph SOIL-1; and Appendix IV, Figure 5.

5.4.1 Mean - Near Field Locations (WIPP South South and WIPP East East)

Nominal mean concentrations are evident and are consistent with the control location, Southeast Control, however, concentrations for $^{233/234}U$ and ^{235}U at all locations exceed the UAL. Concentrations of ^{137}Cs and ^{238}U were detected above the MDA with ^{238}U approaching the UAL.

5.4.2 Far Field Control location (Southeast Control)

Nominal concentrations are evident with only $^{233/234}U$ exceeding the UAL and ^{235}U approaching the UAL. Concentrations of ^{137}Cs and ^{238}U were detected above the MDA with ^{238}U approaching the UAL.

5.5 GROUNDWATER

During the 1995 WIPP sampling year NMED obtained co-located samples from ten wells being sampled by the WIPP. Serial samples are analyzed by the WIPP in the mobile chemistry laboratory before and after taking the environmental samples to ensure stability of the chemical characteristics and comparability of co-located samples. Being sampled for the first time in 1995 were wells; WQSP-1,WQSP-2, WQSP-3, WQSP-4, WQSP-5, WQSP-6 (completed in Culebra Dolomite) and WQSP-6a (completed in the Dewey Lake). These monitoring wells have been completed according to RCRA standards using approved fiberglass casing and dedicated stainless steel pipe and pumps. It is contemplated that these wells will supplant sampling of the older iron cased observation wells used during baseline characterization. Refer to: Appendix I, Summary of 1995 Ground Water Radiochemistry Results (3 pages); Appendix II, graphs GW-1, GW-2, and GW-3; and Appendix IV, Figure 6.

5.5.1 Mean - Culebra member of the Rustler Formation : (Wells; H-03b3, H-14, H-18, WIPP-19, WQSP-1, WQSP-2, WQSP-3, WQSP-4, and WQSP-6)

The mean activity values for these Culebra wells are all below the UAL except for ^{90}Sr. The following were detected above the MDA: ^{241}Am, $^{239/240}Pu$, ^{235}U, ^{238}U, ^{238}Pu, and $^{233/234}U$.

5.5.2 Dewey Lake Formation (Well WQSP-6a)

Nominal activities are evident with $^{233/234}U$, ^{235}U, and ^{238}U detected above the MDA.

5.6 RADIOLOGICAL EXCEEDANCE MATRIX

EXCEEDANCE OF RADIOLOGICAL UAL		
MEDIA	*SAMPLE LOCATION & TYPE*	*>UAL*
BIOTIC TISSUE	Pecos River Catfish	
	NW-1 WIPP vegetation	^{235}U & ^{238}U
SEDIMENT	Mean-Pecos River Sample Locations (Brantley Lake, Carlsbad, Pierce Canyon, Upriver Pecos)	
	Indian Tank	^{238}U
SURFACE WATER	Mean-Pecos River Locations (Brantley Lake, Carlsbad, Pierce Canyon, Upriver Pecos)	^{235}U & ^{238}U
	Brantley Lake	^{235}U
	Carlsbad	^{235}U & ^{238}U
	Pierce Canyon	^{235}U, ^{238}U, & $^{233/234}U$
	Upriver Pecos (Control Location)	^{235}U & ^{238}U
	Indian Tank	^{235}U & ^{238}U
	Site Influent	^{238}U
	Facility West	^{235}U
SOIL	Mean-Near Field Locations (WIPP South South and WIPP East East) (^{238}U approaching UAL)	$^{233/234}U$ & ^{235}U
	WIPP South South	$^{233/234}U$, ^{235}U, & ^{238}U
	WIPP East East	$^{233/234}U$, ^{235}U, & ^{238}U
	Southeast Control (^{235}U approaching UAL)	$^{233/234}U$
GROUND WATER	Mean of wells completed in the Culebra member of the Rustler Formation (Wells H-03b3, H-14, H-18, WIPP-19, WQSP-1, WQSP-2, WQSP-3, WQSP-4, and WQSP-6)	^{90}Sr
	H-03b3	
	H-14	
	H-18	
	WIPP-19	
	WQSP-1	^{90}Sr
	WQSP-2	^{90}Sr
	WQSP-3	^{90}Sr
	WQSP-4	^{90}Sr
	WQSP-6	^{90}Sr
	Dewey Lake (Well WQSP-6a)	

6.0 NON-RADIOLOGICAL SURVEILLANCE

Non-radiological surveillance was conducted on samples from the ground water wells to determine anomalous changes in the Culebra geochemistry. The Facility West surface water location was sampled independently by NMED to determine the basic chemistry of the west retention basin. Splits of soil samples taken during the WIPP Voluntary Corrective Action Program at Solid Waste Management Unit 001-g were analyzed by the NMED contracting laboratory using the Toxicity Characteristic Leaching Procedure (TCLP) for metals and semi-volatiles. These NMED/WIPP TCLP data were used as supporting documentation by the WIPP in the report to EPA entitled, "Data Summary Report No. 2 for Solid Waste Management Units 001n, 001x, 001g, and 001k", Supplement to DOE/WIPP Draft - 2115. NMED also independently analyzed the tissue of Pecos River Catfish for total metals. A Non-radiological exceedance matrix is provided in section 6.5.

6.1 GROUND WATER

Samples for non-radiological parameter analyses were obtained on the same dates and under the same stabilized conditions as the radiological samples. Refer to: Appendix I tables, 1995 General Chemistry and Metals and table 1995 Volatile Organics; Appendix II, graphs GW-1 through GW-7; and Appendix IV, Figure 6.

6.1.1 Volatile Organics

WQSP-1: Volatile organics were not detected.

WQSP-2: Volatile organics were not detected.

WQSP-3: Volatile organics were not detected.

WQSP-4: The Toluene concentration was reported as .9 micrograms per liter (ug/L) with a detection limit of .5 ug/L.

WQSP-6: The Toluene concentration was reported as 1.0 ug/L with a detection limit of .5 ug/L.

6.1.2 Major Cations (Ca, Na, K, & Mg) and Trace Metals (Fe, Li, & B)

H-03b3: Major Cations are within the Upper 95% Confidence Interval of the background range. Boron was slightly below the Lower 95% Confidence Interval.

H-14: Major Cations are within the Upper 95% Confidence Interval of the background range except for Lithium which was slightly below the Lower 95% Confidence Interval.

H-18: Major Cations are within the Upper 95% Confidence Interval of the background range except for Boron and Lithium which were slightly below the Lower 95% Confidence Interval..

WIPP-19: Major Cations appear to be trending downward with most below the Upper 95% Confidence Interval of the background range. Boron, Potassium, and Magnesium are below the Lower 95% Confidence Interval.

6.2 SURFACE WATER

Non-radiological analyses were performed on independently obtained samples from the non-baseline Facility West location. Refer to Appendix I table, 1995 General Chemistry and Metals.

6.2.1 Facility West

Total metals and General Chemistry results are well below the EPA Risk-Based Concentration guidelines.

6.3 SOIL

NMED participated in an oversight role during the Voluntary Corrective Action Program for Solid Waste Management Units (SWMU) 001n, 001x, 001g, and 001k. Split samples from SWMU 001-g were analyzed the same as WIPP but with higher detection limits. Refer to table, 1995 TCLP Semivolatile Organics and TCLP Metals, in Appendix I.

6.3.1 Solid Waste Management Unit - 001g

TCLP semi-volatiles and metals results were all below the Practical Quantitation Limit. DOE split samples were consistent with NMED results.

6.4 BIOTIC TISSUE

Refer to Appendix I table, 1995 Biotic Tissue Metals Results.

6.4.1 Catfish (Pecos River)

This was an independent effort by NMED. Total metals analysis indicates that with this specimen of tissue, the EPA Risk-Based Concentrations were not exceeded.

6.5 NON-RADIOLOGICAL EXCEEDANCE MATRIX

EXCEEDANCE OF UAL AND RBC			
NON-RADIOLOGICAL			
ENVIRONMENTAL MEDIA	SAMPLE LOCATION	>UAL VOLATILE ORGANICS	>RBC TOTAL METALS
GROUND WATER	WQSP-1		
	WQSP-2		
	WQSP-3		
	WQSP-4 Toluene - .9 ug/L detected		
	WQSP-6 Toluene - 1.0 ug/L detected		
	H-03b3		
	H-14		
	H-18		
	WIPP-19 (trending downward)		
SURFACE WATER	Facility West		
SOIL	Solid Waste Management Unit - 001g		
BIOTIC TISSUE	Catfish (Pecos River)	EPA Risk-Based Concentrations were not exceeded.	

UAL - Upper Action Level

RBC - Risk-Based Concentration

7.0 CONCLUSIONS and RECOMMENDATIONS

NMED/WIPP oversight personnel have been afforded opportunities to participate in annual WIPP environmental surveillance sampling activities and non routine sampling activities through diligent notification and support by the WIPP. Participation with WIPP personnel during the sampling events indicate that WIPP environmental monitoring and surveillance procedures (WP02-3) are being implemented properly, i.e., sample collection, handling, and documentation.

1995 NMED data are generally consistent with the radiological baseline and the background ground water characterization ranges with few discrepancies or exceedances. This similarity indicates a relatively stable environment, considering that the baseline/background information was collected almost ten years ago, from 1985 through 1988. To provide for continued data comparability both agencies should continue to implement similar sampling techniques, analytical protocols, and analytical suites.

A major component of WIPP waste will be Americium-241 but is reported only for Soil and Airborne Particulates in the baseline summary. Refer to: Appendix III, Table - 3, Proposed WIPP Radionuclide Disposal Inventory (from the WIPP Transuranic Waste Baseline Inventory Report, CAO-94-1005, Rev. 1, February 1995) .

- DOE should include Am-241 in the radiological baseline summary for Ground Water, Surface Water, Sediment, and Biotic Tissue.

DOE Order 5400.1, General Environmental Protection Program, chapter IV section 3, states; "The preoperational study should begin not less than 1 year, and preferably 2 years before start up to evaluate seasonal changes." A technically sound pre-operational environmental baseline is essential to developing credible dose assessments during operation. The data collected by NMED indicate that the radiological baseline summary document should be revised with more contemporary data, especially in regard to established mean ranges for $^{233/234}U$, ^{235}U, ^{238}U, and ^{90}Sr

in the respective environmental media where the UALs were exceeded.

- DOE should utilize radiological and non-radiological data collected since the issuance of the baseline concentration range summary documents to enhance the quality of the summaries and identify environmental trends or in addition, develop a contemporary or current year baseline comprised of the three previous years environmental data.
- DOE should develop and establish investigatory threshold values
- DOE should investigate the baseline UAL exceedances of $^{233/234}$U(Surface Water and Soil), ^{235}U and ^{238}U(Vegetation, Sediment, Surface Water, and Soil), and ^{90}Sr (Ground Water). Refer to 5.6 Radiological Exceedance Matrix.

The detection of Toluene in WQSP wells 4 and 6 is probably due to laboratory contamination or to solvents used in construction of the wells and not an indication of actual gound water chemistry at this location. However, DOE did not analyze for this compound thereby precluding further comparison.

- DOE should expand the suite of volatile organic compounds analyzed for in the WQSP wells to verify that the wells were not inadvertently contaminated during drilling and completion and for future reference if they are intended for use as RCRA compliance sample locations.

The WIPP Environmental Monitoring Plan (EMP), DOE/WIPP 94-024 in Chapter 7.0, Introduction, paragraph 2, states; "For the data results of the sample media, each data point will be correlated to the "Statistical Summary of the Radiological Baseline for the WIPP," (DOE/WIPP 92-037) and in Section 7.5, Comparisons and Reporting, states; "Comparisons between data sets are performed using standard statistical tests.... In addition to tests comparing data from distinct locations and times, trend analyses are performed on time series where sufficient data exist." Previously issued WIPP site environmental reports have not statistically

compared or attempted to correlate current year DOE/WIPP data with baseline/background ranges to identify long term trends or baseline location anomalies.

- NMED/WIPP recommends that DOE develop and implement a data analyses program in accordance with the WIPP Environmental Monitoring Plan (DOE/WIPP 94-024).

Recent construction of the West and South retention basins, which are designed to retain 100% of the facility run-off, will naturally concentrate constituents deposited resulting from a release or normal facility operations, thus providing an excellent baseline surveillance sample location for sediment and surface water.

- DOE should include the West Retention Basin (NMED 1995 - Facility West sample location) as a radiological baseline sample location for surface water and sediment. (DOE/CAO has verbally agreed to this recommendation.)

^{233}U and ^{234}U are reported in the baseline summary documents separately while the 1994 WIPP Annual Site Environmental Report reports the activities as the composite value, $^{233/234}U$. The specific activities of these nuclides may or may not be additive thus making a viable comparison of the baseline ranges to contemporary data questionable.

- DOE should establish the specific activity baseline range for $^{233/234}U$ to accommodate contemporary analytical reporting protocols, as opposed to reporting the baseline ranges for ^{233}U and ^{234}U separately.

This page intentionally left blank

8.0 REFERENCES

ANL/EAIS-8, Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil, April 1993

ANSI N42.23, Measurement and Associated Instrumentation Quality Assurance for Radioassay Laboratories, September 10, 1995 (proposed)

ASME NQA-1, "Quality Assurance Program Requirements for Nuclear Facilities"

DOE/WIPP 92-037, Statistical Summary of the Radiological Baseline for the Waste Isolation Pilot Plant, March 1992

DOE/WIPP 92-007, Waste Isolation Pilot Plant Site Environmental Report for Calendar Year 1991

DOE/CAO-94-1005 WIPP Transuranic Waste Baseline Inventory Report, Rev. 1, February 1995

DOE/WIPP 94-024, WIPP Environmental Monitoring Plan (EMP)

DOE/WIPP 92-013, Background Water Quality Characterization Report for the Waste Isolation Pilot Plant, June 1992

DOE Order 5400.1, General Environmental Protection Program

DOE Order 5400.5/P, Radiation Protection of the Public & Environment

EML-569, DOE Environmental Measurements Laboratory Semi-Annual Report of the DOE, OEM, Quality Assessment Program, July 1995

Environmental Oversight and Monitoring Agreement Between the U.S. Department of Energy and the State of New Mexico, 1995

EPA QAMS-005/80, "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans"

EPA Region III Risk-Based Concentration Table, October 4, 1995

EPA, Title 40 CFR Part 141, "National Interim Primary Drinking Water Regulations (Safe Drinking Water Act)."

EPA, Title 40 CFR Part 191, "Environmental Radiation Protection Standards for Management

and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes"

EPA, Title 40 CFR Part 264, "Resource Conservation and Recovery Act"

EPA, Title 40 CFR Part 268, "Land Disposal Restrictions and No Migration Variances"

ICRP Publication 23, Reference Man: Anatomical, Physiological and Metabolic Characteristics

NMED, Drinking Water Program, Water Supply Regulations, 1991

NMED Waste Isolation Pilot Plant Site Specific Health and Safety Plan, November 1992

Site Specific Protocol for Implementation of the Environmental Oversight and Monitoring Agreement for the Waste Isolation Pilot Plant, April, 1996

New Mexico Environment Department Site Specific Work Plan for the Waste Isolation Pilot Plant, 1996

NMED/WIPP 193-1, NMED Site Specific Work Plan for the Waste Isolation Pilot Plant, August 1993

NMED/DOE-OB Standard Operating Procedures (Draft)

NMED/WIPP 95-001, NMED/WIPP Environmental Monitoring and Oversight Plan (Draft)

APPENDIX I

1995 Biotic Tissue Radiochemistry

NEW MEXICO ENVIRONMENT DEPARTMENT, DOE OVERSIGHT BUREAU, WIPP

Summary of 1995 Biotic Tissue Radiochemical Analytical Results

		BIOTIC TISSUES							
	TISSUE	VEGETATION				CATFISH			
	LOCATION	NW1				PECOS RIVER			
	SAMPLE DATE	08/09/95				08/23/95			
RADIONUCLIDE	*UNITS*	*Q*	*ACTIVITY*	*ERROR*	*MDA*	*Q*	*ACTIVITY*	*ERROR*	*MDA*
ACTINIUM-228	Bq/g		-0.0060	0.0044	0.0140		0.0034	0.0055	0.0085
AMERICIUM-241	Bq/g		0.0011	0.0008	0.0004		0.0005	0.0006	0.0008
BISMUTH-212	Bq/g		0.0160	0.0160	0.0170		-0.0045	0.0044	0.0150
BISMUTH-214	Bq/g		0.0029	0.0048	0.0064		-0.0023	0.0023	0.0042
CESIUM-137	Bq/g		-0.0004	0.0016	0.0027		-0.0003	0.0005	0.0018
COBALT-60	Bq/g		0.0012	0.0017	0.0038		-0.0001	0.0012	0.0022
G-ALPHA	Bq/g		0.0040	0.0110	0.0210		-0.0019	0.0032	0.0082
G-BETA	Bq/g		0.6540	0.0430	0.0150		0.1070	0.0110	0.0086
LEAD-210(GS)	Bq/g		0.0640	0.0430	0.0580		0.0110	0.0490	0.0730
LEAD-212	Bq/g		0.0010	0.0033	0.0046		0.0012	0.0020	0.0026
LEAD-214	Bq/g		0.0002	0.0040	0.0062		0.0011	0.0024	0.0037
PLUTONIUM-238	Bq/g		-0.0002	0.0003	0.0016				0.0009
PLUTONIUM-239/40	Bq/g		0.0003	0.0007	0.0013		0.0001	0.0007	0.0015
PLUTONIUM-241	Bq/g		0.0450	0.0720	0.0860		0.5900	0.1500	0.1100
POLONIUM-210	Bq/g		0.0380	0.0170	0.0079		0.0029	0.0032	0.0026
POTASSIUM-40	Bq/g		0.5530	0.0880	0.0370		0.1060	0.0300	0.0250
RADIUM-223	Bq/g		-0.0113	0.0100	0.0490				
RADIUM-226	Bq/g		0.0011	0.0009	0.0012		0.0008	0.0006	0.0009
RADIUM-226(GAMMA)	Bq/g		0.0160	0.0400	0.0570		-0.0020	0.0250	0.0360
STRONTIUM-90	Bq/g		0.0100	0.2500	0.0160		0.0100	0.2300	0.0140
THALLIUM-208	Bq/g		0.0018	0.0025	0.0033		0.0002	0.0015	0.0020
THORIUM-228	Bq/g		0.0127	0.0037	0.0035		0.0044	0.0024	0.0028
THORIUM-230	Bq/g		0.0007	0.0009	0.0013		-0.0003	0.0005	0.0011
THORIUM-232	Bq/g		-0.0001	0.0004	0.0010		0.0004	0.0005	0.0007
THORIUM-234	Bq/g		-0.0060	0.0230	0.0540		-0.0050	0.0130	0.0290
URANIUM-233/34	Bq/g		0.0024	0.0012	0.0009		0.0025	0.0012	0.0011
URANIUM-235	Bq/g		0.0004	0.0005	0.0007		0.0004	0.0005	0.0006
URANIUM-235 (GAMMA)	Bq/g		0.0025	0.0088	0.0120		-0.0028	0.0043	0.0077
URANIUM-238	Bq/g		0.0018	0.0010	0.0008		0.0010	0.0009	0.0009

1995 Sediment Radiochemistry

NEW MEXICO ENVIRONMENT DEPARTMENT, DOE OVERSIGHT BUREAU, WIPP
SUMMARY OF 1995 SEDIMENT RADIOCHEMISTRY RESULTS

	Location	BRANTLEY LAKE						CARLSBAD						INDIAN TANK					
	Location code	LBL						CBD						INT					
	Sample Date	06/30/95						06/30/95						06/27/95					
RADIONUCLIDE	UNITS	Q	ACTIVITY	Q	ERROR	Q	MDA	Q	ACTIVITY	Q	ERROR	Q	MDA	Q	ACTIVITY	Q	ERROR	Q	MDA
ACTINIUM-228	Bq/g		0.0260		0.0058		0.0069		0.0187		0.0041		0.0053		0.0422		0.0059		0.0052
AMERICIUM-241	Bq/g		0.0004		0.0006		0.0008		0.0009		0.0008		0.0008		0.0001		0.0004		0.0009
BISMUTH-212	Bq/g		0.0195		0.0094		0.0100		0.0177		0.0070		0.0070						
BISMUTH-214	Bq/g		0.0237		0.0040		0.0031		0.0191		0.0032		0.0029		0.0289		0.0044		0.0031
CESIUM-134	Bq/g														0.0002		0.0006		0.0011
CESIUM-137	Bq/g		0.0007		0.0013		0.0017		0.0038		0.0012		0.0012		0.0135		0.0023		0.0016
COBALT-57	Bq/g														-0.0002		0.0006		0.0011
COBALT-60	Bq/g		-0.0002		0.0002		0.0020		-0.0002		0.0004		0.0012		0.0005		0.0007		0.0014
G-ALPHA	Bq/g	C	0.3300		0.2100		0.2700	C	0.3100		0.1900		0.2500	C	0.5771		0.2220		0.2146
G-BETA	Bq/g		0.5300		0.1500		0.2100		0.4600		0.1500		0.2100		0.9804		0.1739		0.1961
LEAD-210	Bq/g								0.0470		0.1000		0.1400						
LEAD-210(GS)	Bq/g		0.0240		0.0240		0.0360												
LEAD-212	Bq/g		0.0252		0.0038		0.0028		0.0195		0.0029		0.0022		0.0429		0.0052		0.0026
LEAD-214	Bq/g		0.0258		0.0035		0.0031		0.0254		0.0031		0.0024		0.0374		0.0041		0.0029
PLUTONIUM-238	Bq/g		0.0001		0.0004		0.0008		-0.0001		0.0002		0.0009		0.0006		0.0017		0.0025
PLUTONIUM-239/40	Bq/g		-0.0001		0.0001		0.0008		0.0008		0.0009		0.0011		0.0005		0.0008		0.0012
PLUTONIUM-241	Bq/g		0.0600		0.1100		0.1200		0.1400		0.1200		0.1300		0.0718				
POLONIUM-210	Bq/g		0.0007		0.0011		0.0015		0.0000		0.0000		0.0022	Y	0.6770		0.0148		0.0037
POTASSIUM-40	Bq/g		0.3760		0.0530		0.0180		0.3180		0.0410		0.0170				0.0777		0.0174
RADIUM-223	Bq/g		-0.0055		0.0077		0.0290		-0.0040		0.0069		0.0230						
RADIUM-226(GAMMA)	Bq/g		0.0030		0.0210		0.0290		0.0220		0.0190		0.0240						
STRONTIUM-90	Bq/g		0.0000		0.2300		0.0150		0.0000		0.2200		0.0150		0.0026		0.0085		0.0148
THALLIUM-208	Bq/g		0.0076		0.0018		0.0015		0.0063		0.0015		0.0015		0.0122		0.0021		0.0016
THORIUM-228	Bq/g		0.0230		0.0045		0.0032		0.0278		0.0048		0.0032		0.0474		0.0055		0.0023
THORIUM-230	Bq/g		0.0214		0.0037		0.0012		0.0204		0.0035		0.0010		0.0385		0.0048		0.0010
THORIUM-232	Bq/g		0.0198		0.0035		0.0012		0.0171		0.0032		0.0010		0.0414		0.0048		0.0010
THORIUM-234	Bq/g		0.0250		0.0120		0.0290		0.0320		0.0150		0.0450		0.0403		0.0185		0.0555
URANIUM-233/34	Bq/g		0.0226		0.0038		0.0013		0.0347		0.0045		0.0011		0.0322		0.0048		0.0010
URANIUM-235	Bq/g		0.0028		0.0012		0.0004		0.0013		0.0009		0.0008		0.0022		0.0012		0.0007
URANIUM-235 (GAMMA)	Bq/g		0.0043		0.0048		0.0071		0.0019		0.0046		0.0071		0.0037		0.0055		0.0085
URANIUM-238	Bq/g		0.0211		0.0036		0.0009		0.0233		0.0036		0.0009		0.0385		0.0052		0.0009

QUALIFIERS: C - Presence of high TDS in sample required reduction of sample size which increased the MDA.
Y - Chemical yield exceeded acceptance limits.

PAGE # 1

NEW MEXICO ENVIRONMENT DEPARTMENT, DOE OVERSIGHT BUREAU, WIPP
SUMMARY OF 1995 SEDIMENT RADIOCHEMISTRY RESULTS

	Location	PIERCE CANYON						UPRIVER PECOS					
	Location code	PCN						UPP					
	Sample Date	06/29/95						06/30/95					
RADIONUCLIDE	UNITS	Q	ACTIVITY	Q	ERROR	Q	MDA	Q	ACTIVITY	Q	ERROR	Q	MDA
ACTINIUM-228	Bq/g		0.0235		0.0059		0.0081		0.0327		0.0068		0.0075
AMERICIUM-241	Bq/g		0.0008		0.0007		0.0004		0.0007		0.0008		0.0009
BISMUTH-212	Bq/g		0.0180		0.0110		0.0130		0.0220		0.0110		0.0130
BISMUTH-214	Bq/g		0.0242		0.0043		0.0035		0.0266		0.0046		0.0038
CESIUM-134	Bq/g												
CESIUM-137	Bq/g		-0.0007		0.0007		0.0019		0.0020		0.0012		0.0016
COBALT-57	Bq/g												
COBALT-60	Bq/g		-0.0002		0.0007		0.0022		-0.0004		0.0009		0.0022
G-ALPHA	Bq/g	C	0.0600		0.1400		0.2600	C	0.3900		0.1900		0.2200
G-BETA	Bq/g		0.3900		0.1400		0.2100		0.3900		0.1400		0.2100
LEAD-210	Bq/g												
LEAD-210(GS)	Bq/g		0.0220		0.0250		0.0370		0.0460		0.0310		0.0440
LEAD-212	Bq/g		0.0257		0.0039		0.0029		0.0354		0.0047		0.0028
LEAD-214	Bq/g		0.0294		0.0040		0.0037		0.0305		0.0041		0.0034
PLUTONIUM-238	Bq/g		0.0002		0.0004		0.0005		-0.0003		0.0003		0.0014
PLUTONIUM-239/40	Bq/g		0.0000		0.0000		0.0005		0.0000		0.0000		0.0006
PLUTONIUM-241	Bq/g		0.1400		0.1200		0.1200		0.1200		0.1300		0.1600
POLONIUM-210	Bq/g		0.0074		0.0034		0.0011		-0.0000		0.0001		0.0008
POTASSIUM-40	Bq/g		0.4500		0.0610		0.0160		0.4840		0.0650		0.0210
RADIUM-223	Bq/g		-0.0135		0.0091		0.0340		-0.0080		0.0110		0.0350
RADIUM-226(GAMMA)	Bq/g		0.0680		0.0250		0.0310		0.0560		0.0240		0.0320
STRONTIUM-90	Bq/g		0.0100		0.2600		0.0160		0.0000		0.2500		0.0170
THALLIUM-208	Bq/g		0.0075		0.0018		0.0016		0.0122		0.0024		0.0018
THORIUM-228	Bq/g		0.0263		0.0049		0.0034		0.0352		0.0063		0.0042
THORIUM-230	Bq/g		0.0180		0.0034		0.0011		0.0231		0.0043		0.0014
THORIUM-232	Bq/g		0.0187		0.0034		0.0010		0.0274		0.0047		0.0014
THORIUM-234	Bq/g		0.0310		0.0130		0.0330		0.0410		0.0150		0.0380
URANIUM-233/34	Bq/g		0.0282		0.0040		0.0013		0.0281		0.0040		0.0013
URANIUM-235	Bq/g		0.0011		0.0008		0.0008		0.0020		0.0010		0.0004
URANIUM-235 (GAMMA)	Bq/g		-0.0013		0.0046		0.0076		0.0005		0.0055		0.0087
URANIUM-238	Bq/g		0.0247		0.0037		0.0008		0.0234		0.0037		0.0008

QUALIFIERS: C - Presence of high TDS in sample required reduction of sample size which increased the MDA.
Y - Chemical yield exceeded acceptance limits.

PAGE # 2

1995 Surface Water Radiochemistry

NEW MEXICO ENVIRONMENT DEPARTMENT, DOE OVERSIGHT BUREAU, WIPP

SUMMARY OF 1995 SURFACE WATER RADIOCHEMISTRY RESULTS

	Location	PIERCE CANYON					SITE INFLUENT					UPRIVER PECOS				
	Sample Date	09/29/95					09/28/95					09/30/95				
RADIONUCLIDE	UNITS	Q	ACTIVITY	Q	ERROR	Q	MDA	Q	ACTIVITY	Q	ERROR	Q	MDA	Q	ACTIVITY	Q	ERROR	Q	MDA
ACTINIUM-228	Bq/L		-0.0300		0.2900		0.5100		-0.0370		0.7399		1.3688		0.2700		0.8200		1.5000
AMERICIUM-241	Bq/L		0.0008		0.0012		0.0011		0.0011		0.0011		0.0013		0.0010		0.0011		0.0009
BISMUTH-212	Bq/L		0.3900		0.6000		0.7300								1.3000		1.7000		2.0000
BISMUTH-214	Bq/L		0.1700		0.2000		0.2800		1.0359		0.5549		0.7029		-0.2200		0.4300		0.7700
CESIUM-134	Bq/L								0.0962		0.1332		0.2257						
CESIUM-137	Bq/L		-0.0140		0.0600		0.1200		-0.0888		0.1813		0.3515		-0.0900		0.1900		0.3500
COBALT-57	Bq/L								0.0185		0.0925		0.1554						
COBALT-60	Bq/L		0.0080		0.0610		0.1300		0.0962		0.1332		0.3700		-0.0690		0.0610		0.3900
G-ALPHA	Bq/L	C	0.5000		1.2000		2.3000	C	0.0444		0.0629		0.1073	C	0.3900		0.3000		0.4400
G-BETA	Bq/L	C	1.2000		1.3000		2.1000		0.1295		0.0666		0.1036	C	0.6500		0.2800		0.4100
LEAD-210	Bq/L		-0.0100		0.3400		0.0210								0.0400		0.2800		0.0140
LEAD-210(GS)	Bq/L		-1.0000		11.0000		15.0000								1.6000		4.1000		6.3000
LEAD-212	Bq/L		0.1200		0.1900		0.2800		-0.0370		0.3700		0.5549		0.0800		0.3400		0.4900
LEAD-214	Bq/L		-0.0400		0.1800		0.3100		0.7029		0.4440		0.6289		0.0700		0.4300		0.7200
PLUTONIUM-238	Bq/L		0.0000		0.0000		0.0009		0.0002		0.0005		0.0010		0.0000		0.0000		0.0015
PLUTONIUM-239/40	Bq/L		-0.0001		0.0006		0.0021		-0.0001		0.0002		0.0010		-0.0005		0.0006		0.0030
PLUTONIUM-241	Bq/L		0.2900		0.2300		0.2800								0.4200		0.3000		0.3900
POLONIUM-210	Bq/L		0.0019		0.0024		0.0032	Y	0.0041		0.0078		0.0111		0.0380		0.0120		0.0043
POTASSIUM-40	Bq/L		1.7000		1.2000		1.7000		0.4440		2.7747		4.0696		1.2000		2.9000		4.3000
RADIUM-223	Bq/L		-0.4000		0.7100		2.5000								1.4000		1.9000		4.4000
RADIUM-226	Bq/L		0.0023		0.0045		0.0083								0.0138		0.0072		0.0083
RADIUM-226(GAMMA)	Bq/L		0.0000		2.1000		3.2000								0.0000		4.5000		6.8000
RADIUM-228	Bq/L		0.0110		0.0140		0.0240								0.0140		0.0160		0.0270
STRONTIUM-90	Bq/L		0.0000		2.1000		0.1300		-0.0037		0.0096		0.0170		0.1000		3.7000		0.2300
THALLIUM-208	Bq/L		0.0500		0.1100		0.1600		0.0666		0.2516		0.3700		0.0700		0.2600		0.3800
THORIUM-228	Bq/L		0.0128		0.0055		0.0059		0.0035		0.0030		0.0037		0.0346		0.0070		0.0052
THORIUM-230	Bq/L		0.0001		0.0010		0.0019		0.0001		0.0006		0.0012		0.0142		0.0037		0.0017
THORIUM-232	Bq/L		0.0006		0.0011		0.0017		0.0006		0.0008		0.0010		0.0144		0.0037		0.0017
THORIUM-234	Bq/L		0.4000		1.7000		5.3000		1.4798		3.6996		5.9193		2.2000		2.5000		5.7000
URANIUM-233/34	Bq/L		0.3480		0.0650		0.0240		0.0692		0.0129		0.0044		0.1400		0.0460		0.0290
URANIUM-235	Bq/L		0.0360		0.0210		0.0170		0.0036		0.0030		0.0028		0.0210		0.0180		0.0180
URANIUM-235 (GAMMA)	Bq/L		-0.2100		0.4400		0.8400		0.0370		0.9989		1.4798		0.8000		1.0000		1.4000
URANIUM-238	Bq/L		0.1230		0.0380		0.0200		0.0244		0.0074		0.0028		0.0450		0.0250		0.0180

QUALIFIERS:
C - Presence of high TDS in sample required reduction of sample size which increased the MDA.
Y - Chemical yield exceeded acceptance limits.

NEW MEXICO ENVIRONMENT DEPARTMENT, DOE OVERSIGHT BUREAU, WIPP

SUMMARY OF 1995 SURFACE WATER RADIOCHEMISTRY RESULTS

	Location	BRANTLEY LAKE						CARLSBAD						INDIAN TANK					
	Sample Date	06/30/95						06/30/95						06/27/95					
RADIONUCLIDE	UNITS	Q	ACTIVITY	Q	ERROR	Q	MDA	Q	ACTIVITY	Q	ERROR	Q	MDA	Q	ACTIVITY	Q	ERROR	Q	MDA
ACTINIUM-228	Bq/L		0.1100		0.2900		0.5400		0.0600		0.8100		1.5000		-0.6289		0.4809		1.2949
AMERICIUM-241	Bq/L		0.0013		0.0016		0.0021		0.0002		0.0008		0.0017		0.0016		0.0013		0.0007
BISMUTH-212	Bq/L		-0.2100		0.2900		0.8800		-1.1000		0.7000		2.5000						
BISMUTH-214	Bq/L		0.1200		0.2000		0.3100		-0.1000		0.4700		0.7500		1.9238		0.6659		0.7029
CESIUM-134	Bq/L														0.0185		0.1554		0.2849
CESIUM-137	Bq/L		-0.0050		0.0920		0.1300		-0.1300		0.1200		0.3700		0.0074		0.1887		0.3367
COBALT-57	Bq/L														-0.1073		0.1036		0.1924
COBALT-60	Bq/L		-0.0330		0.0400		0.0980		-0.1290		0.0940		0.3800		-0.0866		0.1036		0.3515
G-ALPHA	Bq/L	C	0.0300		0.3500		0.7100	C	0.2900		0.5200		0.9200	C	0.7399		0.3330		0.3515
G-BETA	Bq/L	C	0.3000		0.3500		0.5900	C	-0.2200		0.4400		0.8000	C	1.9904		0.2886		0.2960
LEAD-210	Bq/L		-0.0100		0.2600		0.0150		0.0000		0.2200		0.0130						
LEAD-210(GS)	Bq/L		1.0000		10.0000		15.0000		1.3000		3.8000		5.9000						
LEAD-212	Bq/L		-0.0200		0.2000		0.3100		0.0100		0.3600		0.5300		0.2109		0.3589		0.5179
LEAD-214	Bq/L		0.0200		0.1900		0.3200		0.2100		0.4000		0.6300		1.2949		0.4809		0.5919
PLUTONIUM-238	Bq/L		-0.0004		0.0004		0.0018		-0.0002		0.0003		0.0018		0.0000		0.0000		0.0005
PLUTONIUM-239/40	Bq/L		0.0005		0.0011		0.0018		0.0002		0.0008		0.0018		0.0001		0.0004		0.0008
PLUTONIUM-241	Bq/L		0.2400		0.2000		0.2100		0.5300		0.2600		0.2800						
POLONIUM-210	Bq/L		0.0072		0.0057		0.0051		0.0053		0.0042		0.0037		0.0259		0.0104		0.0029
POTASSIUM-40	Bq/L		-0.0900		0.9700		1.7000		-1.2000		2.4000		4.4000		0.2590		2.8857		4.4395
RADIUM-223	Bq/L		-0.3200		0.7000		2.6000		0.5000		1.4000		5.5000						
RADIUM-226	Bq/L		0.0038		0.0049		0.0081		0.0129		0.0069		0.0077						
RADIUM-226(GAMMA)	Bq/L		0.0000		2.1000		3.1000		0.0000		4.5000		6.1000						
RADIUM-228	Bq/L		0.0100		0.0160		0.0260		0.0000		0.0160		0.0270						
STRONTIUM-90	Bq/L		0.0000		2.3000		0.1500		0.0000		2.2000		0.1400		0.0237		0.0104		0.0155
THALLIUM-208	Bq/L		0.0110		0.1000		0.1500		0.0100		0.2500		0.3700		0.0962		0.2516		0.3515
THORIUM-228	Bq/L		0.0087		0.0056		0.0067		0.0050		0.0047		0.0060		0.0222		0.0044		0.0031
THORIUM-230	Bq/L		0.0017		0.0019		0.0025		0.0015		0.0015		0.0018		0.0215		0.0041		0.0011
THORIUM-232	Bq/L		-0.0004		0.0011		0.0025		-0.0004		0.0007		0.0019		0.0229		0.0041		0.0012
THORIUM-234	Bq/L		-0.1000		1.7000		5.3000		0.5000		2.4000		5.7000		0.9619		2.5157		5.9193
URANIUM-233/34	Bq/L		0.1900		0.0510		0.0230		0.2480		0.0620		0.0250		0.0385		0.0100		0.0044
URANIUM-235	Bq/L		0.0260		0.0180		0.0089		0.0670		0.0330		0.0230		0.0053		0.0036		0.0026
URANIUM-235 (GAMMA)	Bq/L		0.0100		0.5500		0.8300		0.6700		0.9800		1.4000		0.5549		1.0359		1.5168
URANIUM-238	Bq/L		0.0800		0.0330		0.0220		0.1290		0.0460		0.0300		0.0314		0.0089		0.0036

QUALIFIERS:

C - Presence of high TDS in sample required reduction of sample size which increased the MDA.
Y - Chemical yield exceeded acceptance limits.

NEW MEXICO ENVIRONMENT DEPARTMENT, DOE OVERSIGHT BUREAU, WIPP

SUMMARY OF 1995 SURFACE WATER RADIOCHEMISTRY RESULTS

	Location	FACILITY WEST															
	Sample Date	08/30/95															
RADIONUCLIDE	UNITS	Q	ACTIVITY	Q	ERROR	Q	MDA	Q	ACTIVITY	Q	ERROR	Q	MDA	Q	ACTIVITY	Q	ERROR	Q	MDA
ACTINIUM-228	Bq/L																		
AMERICIUM-241	Bq/L	<	0.0018		0.0000		0.0018												
BERYLLIUM-7	Bq/L	<	1.3171		0.0000		1.3171												
BISMUTH-212	Bq/L																		
BISMUTH-214	Bq/L	<	0.0200		0.0000		0.0200												
CESIUM-134	Bq/L																		
CESIUM-137	Bq/L	<	0.1354		0.0000		0.1354												
COBALT-57	Bq/L																		
COBALT-60	Bq/L	<	0.1809		0.0000		0.1809												
G-ALPHA	Bq/L																		
G-BETA	Bq/L																		
LEAD-210	Bq/L		0.1295		0.0185		0.0000												
LEAD-210(GS)	Bq/L																		
LEAD-212	Bq/L																		
LEAD-214	Bq/L	<	0.0107		0.0000		0.0107												
PLUTONIUM-238	Bq/L	<	0.0015		0.0000		0.0015												
PLUTONIUM-239/40	Bq/L	<	0.0007		0.0000		0.0007												
PLUTONIUM-241	Bq/L	<	0.4070		0.0000		0.0000												
POLONIUM-210	Bq/L																		
POTASSIUM-40	Bq/L		2.1569		4.1065		0.0000												
RADIUM-223	Bq/L																		
RADIUM-226	Bq/L	<	0.0148		0.0000		0.0148												
RADIUM-226(GAMMA)	Bq/L																		
RADIUM-228	Bq/L	<	0.0370		0.0000		0.0370												
STRONTIUM-90	Bq/L	<	0.0518		0.0000		0.0518												
THALLIUM-208	Bq/L																		
THORIUM-228	Bq/L	<	0.0044		0.0000		0.0044												
THORIUM-230	Bq/L		0.0067		0.0022		0.0000												
THORIUM-232	Bq/L	<	0.0022		0.0000		0.0022												
THORIUM-234	Bq/L																		
URANIUM-233/34	Bq/L																		
URANIUM-233	Bq/L	<	0.0013		0.0000		0.0013												
URANIUM-234	Bq/L		0.0053		0.0019		0.0000												
URANIUM-235	Bq/L	<	0.0016		0.0000		0.0016												
URANIUM-235 (GAMMA)	Bq/L																		
URANIUM-238	Bq/L		0.0023		0.0011		0.0000												

QUALIFIERS: < - Less than detectable.

1995 Soil Radiochemistry

NEW MEXICO ENVIRONMENT DEPARTMENT, DOE OVERSIGHT BUREAU, WIPP
SUMMARY OF 1995 SOIL RADIOCHEMISTRY RESULTS

	Location Depth series Sample Date	SOUTHEAST CONTROL SURFACE 04/18/95				WIPP EAST EAST DEEP 04/26/95				WIPP SOUTH SOUTH INTERMEDIATE 04/26/95				WIPP SOUTH SOUTH AND WIPP EAST EAST MEAN CONCENTRATION AND MEAN MINIMUM DETECTABLE ACTIVITY (MDA)	
RADIONUCLIDE	UNITS	Q	ACTIVITY	ERROR	MDA	Q	ACTIVITY	ERROR	MDA	Q	ACTIVITY	ERROR	MDA	Mean Activity	Mean MDA
ACTINIUM-228	Bq/g		0.0096	0.0023	0.0028		0.0108	0.0037	0.0048		0.0083	0.0037	0.0052	0.0096	0.0050
AMERICIUM-241	Bq/g		0.0000	0.0005	0.0012		0.0003	0.0006	0.0009		0.0004	0.0006	0.0006	0.0004	0.0008
BISMUTH-214	Bq/g		0.0080	0.0017	0.0017		0.0095	0.0025	0.0024		0.0100	0.0025	0.0024	0.0098	0.0024
CESIUM-134	Bq/g		-0.0001	0.0003	0.0007		-0.0001	0.0003	0.0010		-0.0001	0.0004	0.0011	-0.0001	0.0011
CESIUM-137	Bq/g		0.0037	0.0009	0.0006		0.0050	0.0014	0.0012		0.0040	0.0011	0.0011	0.0045	0.0012
COBALT-57	Bq/g		0.0001	0.0004	0.0007		-0.0001	0.0005	0.0008		-0.0001	0.0005	0.0009	-0.0001	0.0009
COBALT-60	Bq/g		0.0000	0.0003	0.0009		0.0004	0.0006	0.0010		-0.0005	0.0005	0.0014	-0.0001	0.0012
G-ALPHA	Bq/g	C	-0.0666	0.0651	0.2294	C	-0.0185	0.0925	0.2183	C	0.1628	0.1406	0.2035	0.0722	0.2109
G-BETA	Bq/g		0.2812	0.1295	0.1961		0.2035	0.1221	0.1887		0.4846	0.1480	0.2035	0.3441	0.1961
LEAD-212	Bq/g		0.0087	0.0016	0.0015		0.0085	0.0019	0.0018		0.0082	0.0019	0.0019	0.0084	0.0019
LEAD-214	Bq/g		0.0105	0.0016	0.0015		0.0092	0.0020	0.0022		0.0113	0.0021	0.0022	0.0103	0.0022
PLUTONIUM-238	Bq/g		-0.0003	0.0016	0.0025		0.0015	0.0018	0.0021		0.0004	0.0016	0.0024	0.0010	0.0023
PLUTONIUM-239/40	Bq/g		-0.0001	0.0010	0.0017		-0.0004	0.0005	0.0013		0.0002	0.0008	0.0013	-0.0001	0.0013
POLONIUM-210	Bq/g		0.0055	0.0115	0.0148		0.0052	0.0155	0.0218	Y	0.0185	0.0085	0.0028	0.0119	0.0123
POTASSIUM-40	Bq/g		0.1709	0.0229	0.0085		0.2320	0.0348	0.0107		0.2357	0.0348	0.0104	0.2339	0.0106
STRONTIUM-90	Bq/g		0.0033	0.0069	0.0152		-0.0048	0.0074	0.0137		0.0000	0.0081	0.0141	-0.0024	0.0139
THALLIUM-208	Bq/g		0.0028	0.0008	0.0008		0.0031	0.0011	0.0012		0.0031	0.0012	0.0014	0.0031	0.0013
THORIUM-228	Bq/g		0.0139	0.0034	0.0027		0.0137	0.0033	0.0027		0.0130	0.0030	0.0023	0.0134	0.0025
THORIUM-230	Bq/g		0.0090	0.0022	0.0009		0.0087	0.0022	0.0011		0.0041	0.0014	0.0009	0.0064	0.0010
THORIUM-232	Bq/g		0.0092	0.0022	0.0009		0.0096	0.0023	0.0006		0.0066	0.0018	0.0007	0.0081	0.0007
THORIUM-234	Bq/g		0.0141	0.0148	0.0925		0.0074	0.0122	0.0370		0.0144	0.0129	0.0407	0.0109	0.0389
URANIUM-233/34	Bq/g		0.0106	0.0030	0.0015		0.0086	0.0027	0.0016		0.0097	0.0027	0.0011	0.0092	0.0014
URANIUM-235	Bq/g		0.0008	0.0009	0.0011		0.0023	0.0013	0.0010		0.0013	0.0010	0.0010	0.0018	0.0010
URANIUM-235(GAMMA)	Bq/g		0.0001	0.0031	0.0048		0.0015	0.0037	0.0059		-0.0019	0.0034	0.0059	-0.0002	0.0059
URANIUM-238	Bq/g		0.0072	0.0024	0.0012		0.0115	0.0029	0.0010		0.0056	0.0021	0.0013	0.0086	0.0012

QUALIFIERS:
C - Presence of high TDS in sample required reduction of sample size which increased the MDA.
Y - Chemical yield exceeded acceptance limits.

1995 Ground Water Radiochemistry

NEW MEXICO ENVIRONMENT DEPARTMENT, DOE OVERSIGHT BUREAU, WIPP
SUMMARY OF 1995 GROUND WATER RADIOCHEMISTRY RESULTS

		Well Zone Sample Date	H-03b3 CULEBRA 05/23/95				H-14 CULEBRA 06/18/95				H-16 CULEBRA 04/04/95				WIPP-19 CULEBRA 05/02/95			
RADIONUCLIDE	SAMPLE TYPE	UNITS	Q	ACTIVITY	ERROR	MDA	Q	ACTIVITY	ERROR	MDA	Q	ACTIVITY	ERROR	MDA	Q	ACTIVITY	ERROR	MDA
ACTINIUM-228		Bq/L		0.5549	0.3478	0.5549		0.6178	0.3330	0.5179		-0.1110	0.6659	1.5908		1.0729	0.9989	1.7018
AMERICIUM-241		Bq/L		0.0001	0.0006	0.0014		0.0006	0.0010	0.0015		0.0000	0.0006	0.0013		0.0006	0.0009	0.0013
BERYLLIUM-7		Bq/L																
BISMUTH-212		Bq/L		2.6287	0.4440	0.3162		1.9090	0.3663	0.3256		2.3677	0.7029	0.7029		3.3296	0.6139	1.7018
BISMUTH-214		Bq/L		-0.0107	0.0211	0.1073		-0.0070	0.0207	0.0999		-0.1221	0.1221	0.2627		0.0518	0.1591	0.2886
CESIUM-134		Bq/L		-0.0296	0.0555	0.1443		0.0111	0.0962	0.1332		-0.1665	0.1961	0.4070		-0.1036	0.1665	0.3293
CESIUM-137		Bq/L		-0.0111	0.0740	0.1295		-0.0259	0.0666	0.1184		-0.0148	0.1258	0.2183		-0.0111	0.1332	0.2331
COBALT-57		Bq/L		0.0296	0.0666	0.1369		0.0592	0.0629	0.1295		0.0555	0.1369	0.4070		-0.0518	0.1221	0.4070
COBALT-60		Bq/L	C	5.9193	7.3992	12.2087	C	7.3992	3.6996	4.0696	C	5.5494	4.8095	7.3992	C	10.3589	11.4887	20.7177
G-ALPHA		Bq/L	C	22.5675	7.7691	11.0988	C	7.9171	2.9227	4.0696	C	6.6593	4.4395	7.0292	C	29.5967	13.6885	20.7177
G-BETA		Bq/L																
LEAD-210		Bq/L																
LEAD-210	DUPLICATE	Bq/L																
LEAD-210(GS)		Bq/L		0.2701	0.2072	0.2849		0.1665	0.1961	0.2812		0.4070	0.3700	0.5179		0.0000	0.4070	0.5549
LEAD-212		Bq/L		3.0337	0.4070	0.3256		2.0163	0.3145	0.2923		2.7377	0.6289	0.7399		3.4776	0.6659	0.6659
LEAD-214		Bq/L		0.0002	0.0006	0.0011		-0.0001	0.0006	0.0014		-0.0002	0.0003	0.0012		0.0018	0.0012	0.0010
PLUTONIUM-238		Bq/L		0.0000	0.0000	0.0006		0.0002	0.0005	0.0006		0.0002	0.0006	0.0011		0.0003	0.0007	0.0011
PLUTONIUM-239/40		Bq/L																
PLUTONIUM-241		Bq/L																
POLONIUM-210		Bq/L	Y	0.0011	0.0063	0.0144	Y	0.0059	0.0081	0.0078		0.0022	0.0044	0.0063		0.0012	0.0037	0.0078
POLONIUM-210	DUPLICATE	Bq/L																
POTASSIUM-40		Bq/L		12.8006	2.4417	1.5908		6.5653	1.8496	1.7758		5.0684	3.5146	4.0696		14.0585	4.8095	3.6996
RADIUM-223		Bq/L																
RADIUM-226		Bq/L																
RADIUM-226(GAMMA)		Bq/L																
RADIUM-228		Bq/L																
STRONTIUM-90		Bq/L		0.0055	0.0095	0.0166		0.0063	0.0104	0.0174		0.0055	0.0089	0.0152		-0.0067	0.0111	0.0203
STRONTIUM-90	DUPLICATE	Bq/L																
THALLIUM-208		Bq/L		0.0703	0.1184	0.1702		-0.0333	0.1073	0.1702		-0.0407	0.2627	0.4070		-0.1554	0.1406	0.4070
THORIUM-228		Bq/L		0.0511	0.0067	0.0033		0.0163	0.0041	0.0033		0.0459	0.0070	0.0036		0.0969	0.0137	0.0048
THORIUM-230		Bq/L		0.0003	0.0008	0.0013		0.0001	0.0005	0.0009		0.0003	0.0008	0.0013		0.0023	0.0021	0.0023
THORIUM-232		Bq/L		0.0011	0.0009	0.0010		0.0002	0.0006	0.0011		0.0004	0.0008	0.0012		0.0022	0.0023	0.0027
THORIUM-234		Bq/L		-0.5549	1.8496	5.9193		0.0000	4.0696	5.5494		-0.3700	3.6996	5.9193		0.3330	2.5897	5.9193
URANIUM-233/34		Bq/L		0.5253	0.0444	0.0041		0.2886	0.0296	0.0052		0.6622	0.0481	0.0041		0.6659	0.0518	0.0055
URANIUM-234		Bq/L																
URANIUM-235		Bq/L		0.0159	0.0059	0.0034		0.0070	0.0041	0.0034		0.0189	0.0059	0.0026		0.0163	0.0067	0.0041
URANIUM-235 (GAMMA)		Bq/L		0.3330	0.6289	0.9619		-0.2220	0.5179	0.9249		-0.7399	0.8879	1.6278		0.8509	1.0729	1.5538
URANIUM-238		Bq/L		0.0788	0.0137	0.0041		0.0481	0.0111	0.0044		0.1136	0.0159	0.0044		0.1158	0.0185	0.0041

QUALIFIERS:
BDL - Below the Detection Limit.
C - Presence of high TDS in sample required reduction of sample size which increased the MDA.
Y - Chemical yield exceeded acceptance limits.

NEW MEXICO ENVIRONMENT DEPARTMENT, DOE OVERSIGHT BUREAU, WIPP
SUMMARY OF 1995 GROUND WATER RADIOCHEMISTRY RESULTS

		Well Zone Sample Date	WQSP-2 CULEBRA 08/31/95				WQSP-3 CULEBRA 09/19/95				WQSP-4 CULEBRA 09/28/95			
RADIONUCLIDE	SAMPLE TYPE	UNITS	Q	ACTIVITY	ERROR	MDA	Q	ACTIVITY	ERROR	MDA	Q	ACTIVITY	ERROR	MDA
ACTINIUM-228		Bq/L												
AMERICIUM-241		Bq/L	BDL	0.0277			BDL	0.0181			BDL	0.0044		
BERYLLIUM-7		Bq/L	BDL	1.0544			BDL	1.3097			BDL	0.9582		
BISMUTH-212		Bq/L												
BISMUTH-214		Bq/L		4.4395	0.4550	0.0274		6.3263	0.6400	0.0270		11.4687	1.1543	0.0289
CESIUM-134		Bq/L												
CESIUM-137		Bq/L	BDL	0.1424			BDL	0.1720			BDL	0.1583		
COBALT-57		Bq/L												
COBALT-60		Bq/L	BDL	0.1909			BDL	0.2312			BDL	0.1920		
G-ALPHA		Bq/L										12.2087	8.8790	0.0044
G-BETA		Bq/L										48.4647	12.5786	0.0100
LEAD-210		Bq/L	BDL	0.6733				1.3541			BDL	0.6918		
LEAD-210	DUPLICATE	Bq/L												
LEAD-210(GS)		Bq/L												
LEAD-212		Bq/L												
LEAD-214		Bq/L		4.5875	0.4624	0.0133		6.3633	0.6400	0.0152		11.8757	1.1913	0.0170
PLUTONIUM-238		Bq/L	BDL	0.0407			BDL	0.0215			BDL	0.0018		
PLUTONIUM-239/40		Bq/L	BDL	0.0141			BDL	0.0089			BDL	0.0015		
PLUTONIUM-241		Bq/L	BDL	5.8306			BDL	5.8123			BDL	0.9286		
POLONIUM-210		Bq/L	BDLY	0.1225			BDLY	0.0883			BDLY	0.4765		
POLONIUM-210	DUPLICATE	Bq/L												
POTASSIUM-40		Bq/L		17.1661	4.1085	2.0200		47.7248				26.3781	4.4395	4.0696
RADIUM-223		Bq/L												
RADIUM-226		Bq/L		4.5135	0.4587	0.0133		6.3633	0.6400	0.0152		11.8907	1.1728	0.0170
RADIUM-226(GAMMA)		Bq/L												
RADIUM-228		Bq/L		0.6607	0.0866	0.0326		1.2098	0.1339	0.0366		1.8239	0.1968	0.0407
STRONTIUM-90		Bq/L		0.7399	0.4440	0.6659	BDL	0.6659				0.7399	0.4440	0.6659
STRONTIUM-90	DUPLICATE	Bq/L												
THALLIUM-208		Bq/L												
THORIUM-228		Bq/L		0.0252	0.0067	0.0200	BDL	0.0592				0.0270	0.0052	0.0041
THORIUM-230		Bq/L		0.0218	0.0081	0.0100		0.0400	0.0152	0.0048		0.0085	0.0026	0.0067
THORIUM-232		Bq/L	BDL	0.0092			BDL	0.0170			BDL	0.0018		
THORIUM-234		Bq/L										0.5823		
URANIUM-233/34		Bq/L												
URANIUM-234		Bq/L		1.1210	0.1332	0.0018		0.4514	0.0777	0.0030			0.0703	0.0022
URANIUM-235		Bq/L			0.0033	0.0011		0.0200	0.0118	0.0022		0.0063	0.0022	0.0018
URANIUM-235 (GAMMA)		Bq/L		0.0118										
URANIUM-238		Bq/L		0.1791	0.0244	0.0015		0.1685	0.0407	0.0018		0.0925	0.0137	0.0018

QUALIFIERS:
BDL - Below the Detection Limit.
C - Presence of high TDS in sample required reduction of sample size which increased the MDA.
Y - Chemical yield exceeded acceptance limits.

NEW MEXICO ENVIRONMENT DEPARTMENT, DOE OVERSIGHT BUREAU, WIPP
SUMMARY OF 1995 GROUND WATER RADIOCHEMISTRY RESULTS

		Well	WQSP-1				WQSP-6				WQSP-6a				Rustler/Culebra Mean*		
		Zone	CULEBRA				CULEBRA				DEWEY LAKE				Activity and MDA		
		Sample Date	08/17/95				10/16/95				07/13/95				1995 NMED Results		
RADIONUCLIDE	SAMPLE TYPE	UNITS	Q	ACTIVITY	ERROR	MDA	Q	ACTIVITY	ERROR	MDA	Q	ACTIVITY	ERROR	MDA	Mean	Std. Dev.	MDA
ACTINIUM-228		Bq/L										0.4100	0.8300	1.4000	0.3539	0.4039	0.8879
AMERICIUM-241		Bq/L	BDL	0.0266			BDL	0.0159		0.0159		-0.0001	0.0007	0.0019	0.0117	0.0119	0.0050
BERYLLIUM-7		Bq/L	BDL	1.0174			BDL	1.1987		1.1987					1.1077	0.1435	1.1987
BISMUTH-212		Bq/L										0.3000	1.7000	2.3000			
BISMUTH-214		Bq/L		7.0292	0.7103	0.0226		1.6204	0.1706			0.9000	0.5800	0.7300	4.7235	3.4009	0.2075
CESIUM-134		Bq/L													-0.0466	0.0654	0.1506
CESIUM-137		Bq/L	BDL	0.1162			BDL	0.1321		0.1321		-0.0700	0.1800	0.3100	0.0870	0.1187	0.2042
COBALT-57		Bq/L													-0.0173	0.0077	0.1554
COBALT-60		Bq/L	BDL	0.1406			BDL	0.1628		0.1828		-0.0200	0.1100	0.4300	0.1352	0.0766	0.2141
G-ALPHA		Bq/L									C	-0.3100	0.7200	1.6000	7.7691	3.0657	5.9205
G-BETA		Bq/L									C	0.2800	0.7700	1.3000	21.4021	19.4331	5.5519
LEAD-210		Bq/L	BDL	0.8361			BDL	0.8990		0.8990		0.0000	2.1000	0.1100	0.8909	0.2759	0.8990
LEAD-210	DUPLICATE	Bq/L					BDL	0.6918		0.6918					0.6918		0.6918
LEAD-210(GS)		Bq/L										0.7000	4.2000	6.5000			
LEAD-212		Bq/L										0.0000	0.3500	0.5300	0.2812	0.1206	0.3613
LEAD-214		Bq/L		6.6223	0.6659	0.0122		1.4687	0.1513			1.0000	0.4700	0.6600	4.8361	3.4243	0.2022
PLUTONIUM-238		Bq/L	BDL	0.0444			BDL	0.0026		0.0026		-0.0001	0.0007	0.0017	0.0139	0.0191	0.0016
PLUTONIUM-239/40		Bq/L	BDL	0.0200			BDL	0.0011		0.0011		0.0002	0.0006	0.0013	0.0057	0.0077	0.0009
PLUTONIUM-241		Bq/L	BDL	5.4828			BDL	5.9083		5.9083		0.2100	0.1900	0.1900	4.7525	2.1443	5.9083
POLONIUM-210		Bq/L	BDL	1.5083			BDL	0.0814		0.1633		0.0038	0.0060	0.0091	0.2833	0.5191	0.0480
POLONIUM-210	DUPLICATE	Bq/L					BDL	0.1105		0.2215					0.1105		0.2215
POTASSIUM-40		Bq/L		13.4295	3.8476	1.7573		4.6985	4.0896			0.8000	2.7000	4.1000	16.7314	14.4615	2.5472
RADIUM-223		Bq/L										-1.1000	1.3000	5.4000			
RADIUM-226		Bq/L		6.8073	0.6861	0.0122						0.0063	0.0053	0.0075	7.3437	3.0635	0.0144
RADIUM-226(GAMMA)		Bq/L						1.5464	0.1609			-0.8000	4.3000	6.8000	1.5464		
RADIUM-228		Bq/L		1.3023	0.1443	0.0328		0.2434	0.0418			0.0030	0.0150	0.0280	1.0520	0.6072	0.0356
STRONTIUM-90		Bq/L		0.7399	0.4440	0.6859	BDL	2.2588		2.2588		0.0000	2.2000	0.1400	0.8450	0.7417	0.6148
STRONTIUM-90	DUPLICATE	Bq/L					BDL	1.9608		1.9608					1.9608		1.9608
THALLIUM-208		Bq/L										-0.0900	0.2600	0.4000	-0.0012	0.0621	0.2491
THORIUM-228		Bq/L		0.0750	0.0162	0.0199	BDL	0.0055		0.0055		0.0156	0.0062	0.0064	0.0381	0.0235	0.0085
THORIUM-230		Bq/L		0.0317	0.0111	0.0100		0.0052	0.0018			0.0029	0.0019	0.0014	0.0135	0.0157	0.0050
THORIUM-232		Bq/L	BDL	0.0102			BDL	0.0022		0.0022		0.0003	0.0008	0.0008	0.0053	0.0062	0.0014
THORIUM-234		Bq/L										0.8000	2.5000	5.7000	-0.0906	0.4927	5.7960
URANIUM-233/34		Bq/L										0.3660	0.0680	0.0250	0.4920	0.1890	0.0045
URANIUM-234		Bq/L		1.3725	0.1628	0.0018		0.5364	0.0666						0.8703	0.4480	0.0022
URANIUM-235		Bq/L		0.0137	0.0037	0.0011		0.0052	0.0018			0.0470	0.0240	0.0160	0.0124	0.0062	0.0022
URANIUM-235 (GAMMA)		Bq/L										-0.2700	0.8900	1.5000	-0.1543	0.4519	1.1715
URANIUM-238		Bq/L		0.2201	0.0292	0.0015		0.0821	0.0122			0.1980	0.0500	0.0240	0.1226	0.0594	0.0028

QUALIFIERS & ACRONYM
BDL - Below the Detection Limit.
C - Presence of high TDS in sample required reduction of sample size which increased the MDA.
Y - Chemical yield exceeded acceptance limits.
MDA - Minimum Detectable Activity
Std. Dev. - Standard Deviation of the Mean (Average)

* - The Dewey Lake member of the Rustler Formation is excluded from the mean calculation.

1995 General Chemistry and Metals

NEW MEXICO ENVIRONMENT DEPARTMENT, DOE OVERSIGHT BUREAU, WIPP

SUMMARY OF 1995 GENERAL CHEMISTRY AND METALS ANALYTICAL RESULTS

	LOCATION ZONE SAMPLE DATE	FACILITY WEST WEST BERM 06/30/95		H-03b3 CULEBRA 05/23/95		H-14 CULEBRA 06/19/95		H-18 CULEBRA 04/04/95		WIPP-19 CULEBRA 05/02/95	
PARAMETER	UNITS	V	RESULT	V	RESULT	V	RESULT	V	RESULT	V	RESULT
AMMONIA AS NITROGEN	mg/L										
BICARBONATE AS CACO3	mg/L		62.0000								
CARBON DIOXIDE AS CACO3	mg/L		1.0000								
CARBONATE AS CACO3	mg/L		1.0000								
HYDROXIDE AS CACO3	mg/L	<	1.0000								
TOTAL ALKALINITY AS CACO3	mg/L		63.0000								
TOTAL DISSOLVED SOLIDS	mg/L		60.0000								
TOTAL ORGANIC CARBON	mg/L										
TOTAL ORGANIC HALIDES	mg/L										
TOTAL PHOSPHATE AS PHOSPHORUS	mg/L		0.1300								
TOTAL SUSPENDED SOLIDS	mg/L		30.0000								
ELECTRICAL CONDUCTIVITY	umhos/cm		140.0000								
CHLORIDE	mg/L										
SULFATE	mg/L	<	10.0000								
FLUORIDE	mg/L	<	0.2000								
IODIDE	mg/L										
NITRATE AS NITROGEN	mg/L										
pH	SU		8.4100								
PHENOLS, TOTAL	mg/L										
SPECIFIC GRAVITY	g/ml		1.0000								
ARSENIC	mg/L	<	0.0100	<	0.0020	<	0.0020	<	0.0020	<	0.0200
BARIUM	mg/L	<	0.1000		0.0234		0.0251		0.0187		0.0369
BERYLLIUM	mg/L	<	0.0050	<	0.0100	<	0.0010	<	0.0010	<	0.0100
BORON	mg/L		0.0200		17.4000		9.4600		13.0000	<	0.0800
BROMIDE	mg/L										
CADMIUM	mg/L	<	0.0050	<	0.0100	<	0.0010	<	0.0010	<	0.0100
CALCIUM	mg/L		32.0000		1440.0000		1720.0000		1140.0000		1500.0000
CHROMIUM	mg/L	<	0.0100	<	0.0100	<	0.0010	<	0.0010	<	0.0100
IRON	mg/L		2.0000	<	0.1500		0.3760		0.2420	<	0.1500
LEAD	mg/L	<	0.0030	<	0.0100		1.4000	<	0.0100	<	0.0100
LITHIUM	mg/L	<	0.0100		0.3050		0.3600		0.2400		0.4110
MAGNESIUM	mg/L		4.0000		744.0000		533.0000		524.0000		946.0000
MERCURY	mg/L	<	0.0002	<	0.0002	<	0.0002		0.0012		0.0002
POTASSIUM	mg/L		2.0000		428.0000		234.0000		210.0000		540.0000
SELENIUM	mg/L	<	0.0050	<	0.0300	<	0.0030		0.0052	<	0.0300
SILICA	mg/L										
SILICON	mg/L		8.7000		4.3700		4.7500		4.8600		3.6400
SILVER	mg/L	<	0.0100	<	0.0010	<	0.0010	<	0.0010	<	0.0100
SODIUM	mg/L		8.0000		17700.0000		3430.0000		8750.0000		24600.0000
STRONTIUM	mg/L		0.1100		24.3000		30.9000		14.8000		23.1000

LEGEND for qualifiers (V column) :

U - Constituent was analyzed for but not detected (sample quantitation must be corrected for dilution and percent moisture).
H - Sample analysis performed outside of method holding time.
@H - Detection level elevated due to matrix interference.
S - Reported value was determined from the method of standard addition.
C - Any constituent that was also detected in the associated blank whose concentration was greater than the reporting detection limit (RDL).
N - Matrix spike recovery exceeded acceptance limits.
D - Presence of high levels of interfering constituents required dilution of sample which increased the RDL by the dilution factor.
< - Less than detectable.

Page 1

NEW MEXICO ENVIRONMENT DEPARTMENT, DOE OVERSIGHT BUREAU, WIPP
SUMMARY OF 1995 GENERAL CHEMISTRY AND METALS ANALYTICAL RESULTS

	LOCATION	WQSP-1		WQSP-2		WQSP-3		WQSP-4		WQSP-6		WQSP-6a	
	ZONE	CULEBRA		CULEBRA		CULEBRA		CULEBRA		CULEBRA		DEWEY LAKE	
	SAMPLE DATE	08/17/95		08/31/95		09/19/95		09/28/95		10/16/95		07/13/95	
PARAMETER	UNITS	V	RESULT	V	RESULT	V	RESULT	V	RESULT	V	RESULT	V	RESUL
AMMONIA AS NITROGEN	mg/L									<	0.0600		
BICARBONATE AS CACO3	mg/L		49.0000		48.0000		34.5000		43.0000		47.5000		
CARBON DIOXIDE AS CACO3	mg/L												
CARBONATE AS CACO3	mg/L	<	5.0000	<	5.0000	<	5.0000	<	5.0000	<	5.0000		
HYDROXIDE AS CACO3	mg/L	<	5.0000	<	5.0000	<	5.0000	<	5.0000	<	5.0000		
TOTAL ALKALINITY AS CACO3	mg/L		49.0000		48.0000		34.5000		43.0000		47.5000		
TOTAL DISSOLVED SOLIDS	mg/L		67600.0000		64400.0000		224000.0000		109000.0000		22200.0000		
TOTAL ORGANIC CARBON	mg/L		0.5000	<	0.5000	<	12.4000		0.7000		0.7000		
TOTAL ORGANIC HALIDES	mg/L		6.7000		3.5000		7.5000		0.5800		2.9000		
TOTAL PHOSPHATE AS PHOSPHORUS	mg/L		0.2600	<	0.1000	<	0.1000	<	0.1000		0.4300		
TOTAL SUSPENDED SOLIDS	mg/L		28.0000	<	20.0000	<	42.0000	<	20.0000	<	20.0000		
ELECTRICAL CONDUCTIVITY	umhos/cm		78500.0000		77000.0000		168000.0000		99500.0000				
CHLORIDE	mg/L		38400.0000		34700.0000		135000.0000		55400.0000		7590.0000		
SULFATE	mg/L		4410.0000		4670.0000		6630.0000		6650.0000		5210.0000		
FLUORIDE	mg/L		1.0000		1.4000		0.7400		1.5000		2.2000		
IODIDE	mg/L	<	2.5000	<	2.5000	<	5.0000	<	5.0000	<	0.5000		
NITRATE AS NITROGEN	mg/L	<	0.0600	<	0.0600	<	0.0600	<	0.0600				
pH	SU		6.9400		6.2800		6.8300		7.1100		7.5600		
PHENOLS, TOTAL	mg/L	<	0.0200	<	0.0200	@H	0.0400	<	0.0200				
SPECIFIC GRAVITY	g/ml		1.0415		1.0450		1.1504		1.0089				
ARSENIC	mg/L	<	0.1500	@	0.4000	@H	0.1900	@H	0.0400	<@H	0.0100	U	0.0050
BARIUM	mg/L		0.0240		0.0200	@H	0.0400	@H	0.0400	<@H	0.0500	U	0.0500
BERYLLIUM	mg/L	<	0.0040	@	0.0060		0.0130		0.0400	<@H	0.0200	U	0.0010
BORON	mg/L		19.4000		16.0000		45.4000		29.4000		16.7000		0.3800
BROMIDE	mg/L		50.0000		46.0000		120.0000		70.0000		18.0000		
CADMIUM	mg/L	<	0.0130	@	0.0500	@H	0.0400	@H	0.1000	S	0.0064	U	0.0010
CALCIUM	mg/L		1780.0000		1460.0000		1330.0000		1610.0000		811.0000	D	590.0000
CHROMIUM	mg/L	<	0.0030	@	0.0300	@H	0.0300	@H	0.0300	<@H	0.0500	U	0.0050
IRON	mg/L		0.0900	@	0.1000		0.2000		0.1100	<@H	0.0500		0.1600
LEAD	mg/L	<	0.0850	@	0.2000	@H	0.2800	@H	0.4000	<S	0.0110	U	0.0030
LITHIUM	mg/L		1.0200		0.5700		1.0000		0.8000		0.3800	U	0.1000
MAGNESIUM	mg/L		937.0000		969.0000		2060.0000		1130.0000		275.0000	D	160.0000
MERCURY	mg/L	<	0.0050	<	0.0005	<	0.0005	<	0.0005	<	0.0005	UH	0.0002
POTASSIUM	mg/L		694.0000		479.0000		1480.0000		771.0000		205.0000		4.7000
SELENIUM	mg/L		0.2620	@	0.2000	@H	0.4200	@H	0.2000	<S	0.0300	N	0.0160
SILICA	mg/L		10.8000		14.3000		5.3000		1.2000				
SILICON	mg/L										4.6800	C	11.0000
SILVER	mg/L		0.0050		0.0060	@H	0.0400	@H	0.0400	<@H	0.0500	U	0.0020
SODIUM	mg/L		20200.0000		22400.0000		76600.0000		35500.0000		6840.0000	D	300.0000
STRONTIUM	mg/L		19.9000		21.1000		21.2000		23.8000		13.6000	D	8.7000

LEGEND for qualifiers (V column) :

U - Constituent was analyzed for but not detected (sample quantitation must be corrected for dilution and percent moisture).
H - Sample analysis performed outside of method holding time.
@H - Detection level elevated due to matrix interference.
S - Reported value was determined from the method of standard addition.
C - Any constituent that was also detected in the associated blank whose concentration was greater than the reporting detection limit (RDL).
N - Matrix spike recovery exceeded acceptance limits.
D - Presence of high levels of interfering constituents required dilution of sample which increased the RDL by the dilution factor.
< - Less than detectable

Page 2

1995 Volatile Organics

NEW MEXICO ENVIRONMENT DEPARTMENT, DOE OVERSIGHT BUREAU, WIPP

SUMMARY OF 1995 VOLATILE ORGANIC ANALYTICAL RESULTS

	LOCATION ZONE SAMPLE DATE	WQSP-1 CULEBRA 08/17/95		WQSP-2 CULEBRA 08/31/95		WQSP-3 CULEBRA 09/19/95		WQSP-4 CULEBRA 09/28/95		WQSP-6 CULEBRA 10/16/95	
PARAMETER	*UNITS*	*V*	*RESULT*	*V*	*RESULT*	*V*	*RESULT*	*V*	*RESULT*	*V*	*RESULT*
1,1,1-TRICHLOROETHANE	ug/L	<	1.0000	<	1.0000	<	1.0000	<	1.0000	<	1.0000
1,1,2,2--TETRACHLOROETHANE	ug/L									<	0.2000
1,1,2,2-TETRACHLOROETHANE	ug/L	<	0.2000	<	0.2000	<	0.2000	<	0.2000		
1,1,2-TRICHLOROETHANE	ug/L	<	0.2000	<	0.2000	<	0.2000	<	0.2000	<	0.2000
1,1-DICHLOROETHANE	ug/L	<	0.2000	<	0.2000	<	0.2000	<	0.2000	<	0.2000
1,1-DICHLOROETHENE	ug/L	<	0.2000	<	0.2000	<	0.2000	<	0.2000	<	0.2000
1,2-DIBROMOETHANE (EDB)	ug/L	<	0.2000	<	0.2000	<	0.2000	<	0.2000	<	0.2000
1,2-DICHLOROBENZENE	ug/L	<	0.5000	<	0.5000	<	0.5000	<	0.5000	<	0.5000
1,2-DICHLOROETHANE (EDC)	ug/L	<	0.5000	<	0.5000	<	0.5000	<	0.5000	<	0.5000
1,2-DICHLOROPROPANE	ug/L	<	0.2000	<	0.2000	<	0.2000	<	0.2000	<	0.2000
1,3-DICHLOROBENZENE	ug/L	<	0.5000	<	0.5000	<	0.5000	<	0.5000	<	0.5000
1,4-DICHLOROBENZENE	ug/L	<	0.5000	<	0.5000	<	0.5000	<	0.5000	<	0.5000
ACETONE	ug/L							<	50.0000		
BENZENE	ug/L	<	0.5000	<	0.5000	<	0.5000	<	0.5000	<	0.5000
BROMODICHLOROMETHANE	ug/L	<	0.2000	<	0.2000	<	0.2000	<	0.2000	<	0.2000
BROMOFORM	ug/L	<	0.5000	<	0.5000	<	0.5000	<	0.5000	<	0.5000
BROMOMETHANE	ug/L	<	1.0000	<	1.0000	<	1.0000	<	1.0000	<	1.0000
CARBON TETRACHLORIDE	ug/L	<	0.2000	<	0.2000	<	0.2000	<	0.2000	<	0.2000
CHLOROBENZENE	ug/L	<	0.5000	<	0.5000	<	0.5000	<	0.5000	<	0.5000
CHLOROETHANE	ug/L	<	0.5000	<	0.5000	<	0.5000	<	0.5000	<	0.5000
CHLOROFORM	ug/L	<	0.5000	<	0.5000	<	0.5000	<	0.5000	<	0.5000
CHLOROMETHANE	ug/L	<	1.0000	<	1.0000	<	1.0000	<	1.0000	<	1.0000
CIS-1,2-DICHLOROETHENE	ug/L	<	0.2000	<	0.2000	<	0.2000	<	0.2000	<	0.2000
CIS-1,3-DICHLOROPROPENE	ug/L	<	0.2000	<	0.2000	<	0.2000	<	0.2000	<	0.2000
DIBROMOCHLOROMETHANE	ug/L	<	0.2000	<	0.2000	<	0.2000	<	0.2000	<	0.2000
ETHYLBENZENE	ug/L	<	0.5000	<	0.5000	<	0.5000	<	0.5000	<	0.5000
METHYL-t-BUTYL ETHER (MTBE)	ug/L	<	2.5000	<	2.5000	<	2.5000	<	2.5000	<	2.5000
METHYLENE CHLORIDE	ug/L	<	2.0000	<	2.0000	<	2.0000	<	2.0000	<	2.0000
TETRACHLOROETHENE	ug/L	<	0.5000	<	0.5000	<	0.5000	<	0.5000	<	0.5000
TOLUENE	ug/L	<	0.5000	<	0.5000	<	0.5000		0.9000		1.0000
TOTAL XYLENES	ug/L	<	0.5000	<	0.5000	<	0.5000	<	0.5000	<	0.5000
TRANS-1,2-DICHLOROETHENE	ug/L	<	1.0000	<	1.0000	<	1.0000	<	1.0000	<	1.0000
TRANS-1,3-DICHLOROPROPENE	ug/L	<	0.2000	<	0.2000	<	0.2000	<	0.2000	<	0.2000
TRICHLOROETHENE	ug/L	<	0.2000	<	0.2000	<	0.2000	<	0.2000	<	0.2000
TRICHLOROFLUOROMETHANE	ug/L	<	0.2000	<	0.2000	<	0.2000	<	0.2000	<	0.2000
TRICHLOROTRIFLUOROETHANE	ug/L							<	2.0000		
VINYL CHLORIDE	ug/L	<	0.5000	<	0.5000	<	0.5000	<	0.5000	<	0.5000

LEGEND FOR QUALIFIERS : < - Less than detectable.

1995 TCLP Semivolatile Organics and TCLP Metals

NEW MEXICO ENVIRONMENT DEPARTMENT, DOE OVERSIGHT BUREAU, WIPP

TCLP SEMIVOLATILE ORGANICS AND TCLP METALS RESULTS

(Split Samples of Soil taken during the WIPP RCRA Voluntary Corrective Action Program SWMU Investigation)

	Location	SWMU-001g (Wells H-14 and P-1 Hydro-Pad Mudpit)											
	Sample ID#	S951004H14EM						S951004H14WM					
	Sample Date	10/04/95						10/04/95					
PARAMETER	*UNITS*	*Q*	*RESULT*	*Q*	*PQL**	*Q*	*MB** RESULT*	*Q*	*RESULT*	*Q*	*PQL**	*Q*	*MB** RESULT*
1,4-Dichlorobenzene	mg/L	U***	0.10		0.10	U	0.10	U	0.10		0.10	U	0.10
2,4,5-Trichlorophenol	mg/L	U	0.10		0.10	U	0.10	U	0.10		0.10	U	0.10
2,4,6-Trichlorophenol	mg/L	U	0.10		0.10	U	0.10	U	0.10		0.10	U	0.10
2,4-Dinitrotoluene	mg/L	U	0.10		0.10	U	0.10	U	0.10		0.10	U	0.10
2-Methylphenol	mg/L	U	0.10		0.10	U	0.10	U	0.10		0.10	U	0.10
3 & 4 -Methylphenol	mg/L	U	0.20		0.20	U	0.20	U	0.20		0.20	U	0.20
Hexachlorobenzene	mg/L	U	0.10		0.10	U	0.10	U	0.10		0.10	U	0.10
Hexachlorobutadiene	mg/L	U	0.10		0.10	U	0.10	U	0.10		0.10	U	0.10
Hexachloroethane	mg/L	U	0.10		0.10	U	0.10	U	0.10		0.10	U	0.10
Nitrobenzene	mg/L	U	0.10		0.10	U	0.10	U	0.10		0.10	U	0.10
Pentachlorophenol	mg/L	U	0.50		0.50	U	0.50	U	0.50		0.50	U	0.50
Pyridine	mg/L	U	0.50		0.50	U	0.50	U	0.50		0.50	U	0.50
Arsenic	mg/L	U	1.00		1.00	U	1.00	U	1.00		1.00	U	1.00
Barium	mg/L	U	10.00		10.00	U	10.00	U	10.00		10.00	U	10.00
Cadmium	mg/L	U	0.10		0.10	U	0.10	U	0.10		0.10	U	0.10
Chromium	mg/L	U	0.50		0.50	U	0.50	U	0.50		0.50	U	0.50
Lead	mg/L	U	1.00		1.00	U	1.00	U	1.00		1.00	U	1.00
Mercury	mg/L	U	0.02		0.02	U	0.02	U	0.02		0.02	U	0.02
Selenium	mg/L	U	0.10		0.10	U	0.10	U	0.10		0.10	U	0.10
Silver	mg/L	U	0.50		0.50	U	0.50	U	0.50		0.50	U	0.50

* PQL - Practical Quantiation Limit
**MB - Matrix Blank
***U - Constituent was analyzed for but not detected (sample quantitation must be corrected for dilution and percent moisture.

1995 Biotic Tissue Total Metals

NEW MEXICO ENVIRONMENT DEPARTMENT, DOE OVERSIGHT BUREAU, WIPP

BIOTIC TISSUE

1995 - TOTAL METALS RESULTS

	Location/Tissue	Pecos River/Catfish											
	Sample ID	BIO950823PECCAT											
	Sample Date	08/23/95											
PARAMETER	UNITS	V	RESULT	PQL	V	RESULT	PQL	V	RESULT	PQL	V	RESULT	PQL
Arsenic	mg/kg	U	0.2500	0.2500									
Barium	mg/kg	U	2.5000	2.5000									
Beryllium	mg/kg	U	0.0500	0.0500									
Boron	mg/kg	U	5.0000	5.0000									
Cadmium	mg/kg	U	0.0500	0.0500									
Calcium	mg/kg	D	8100.0000	125.0000									
Chromium	mg/kg	*	0.5900	0.2500									
Iron	mg/kg	*	12.0000	5.0000									
Lead	mg/kg	U	0.1500	0.1500									
Lithium	mg/kg	U	5.0000	5.0000									
Magnesium	mg/kg		330.0000	25.0000									
Mercury	mg/kg	H	0.0530	0.0095									
Potassium	mg/kg		3100.0000	25.0000									
Selenium	mg/kg		0.6100	0.2500									
Silicon	mg/kg	C	26.0000	5.0000									
Silver	mg/kg		0.1400	0.1000									
Sodium	mg/kg		720.0000	25.0000									
Strontium	mg/kg	D	32.0000	25.0000									

DATA QUALIFIERS (COLUMN V):

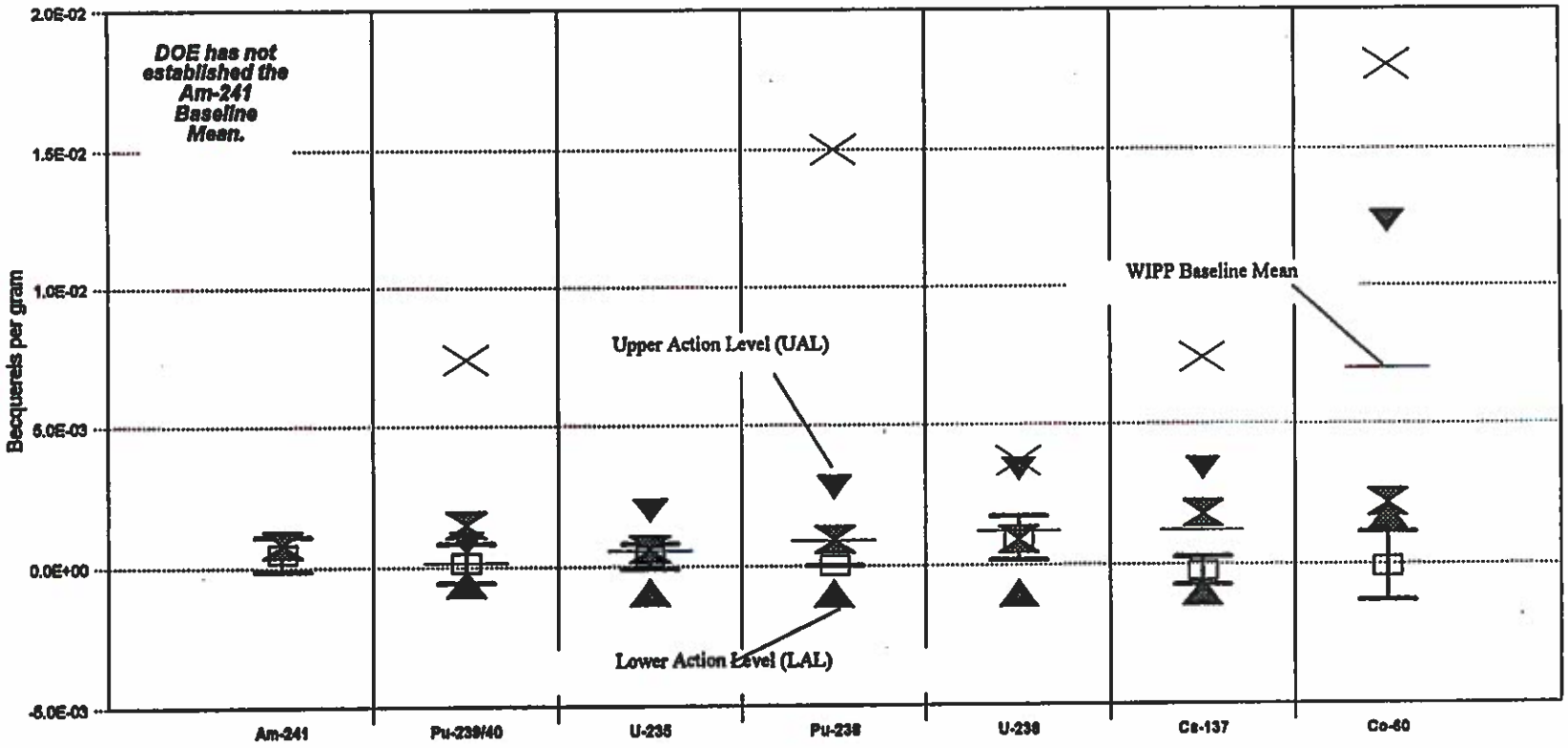
PQL- Practical Quantitation Limit
U - Constituent was analyzed for but not detected (sample quantitation must be corrected for dilution and percent moisture).
H - Sample analysis performed outside of method holding time.
C - Any constituent that was also detected in the associated blank whose concentration was greater than the reporting detection limit (RDL).
D - Presence of high levels of interfering constituents required dilution of sample which increased the RDL by the dilution factor.
* - Relative Percent Difference (RPD) for duplicate analysis exceeded acceptance limits.

APPENDIX II

NMED/WIPP BIOTIC TISSUE RADIOCHEMISTRY

PECOS RIVER CATFISH 1995

Graph BT-1
NMED/WIPP
1995 Pecos River Catfish



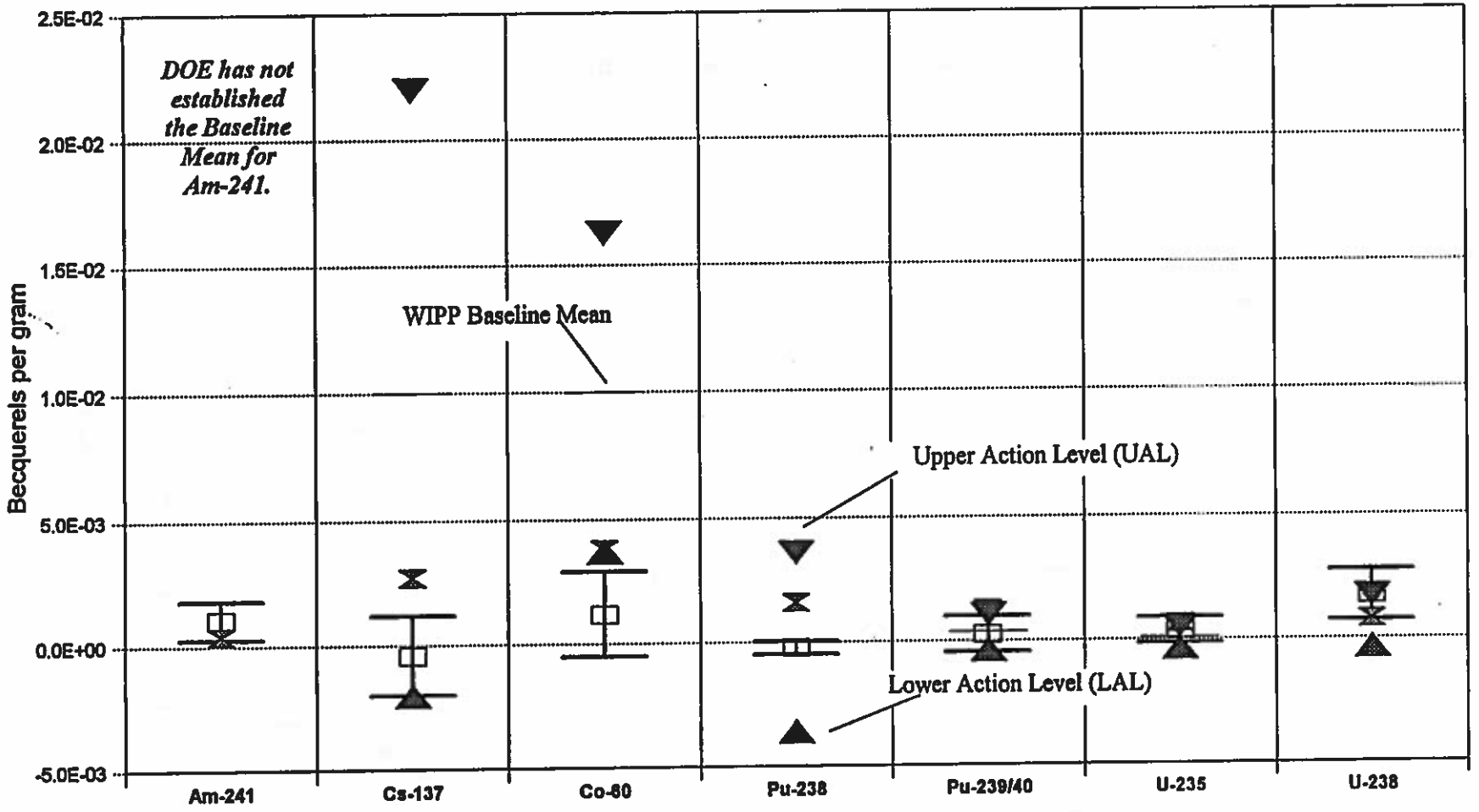
NMED 1995 Activity Range +/- Error Minimum Detectable Activity WIPP Baseline Mean MDL

UAL = WIPP Baseline Mean plus 2 standard deviations. LAL = WIPP Baseline Mean minus 2 standard deviations.

Graph BT-2
NMED/WIPP
1995 NW1 Vegetation

NMED/WIPP VEGETATION RADIOCHEMISTRY

NW 1 MONITORING PLOT - VEGETATION 1995



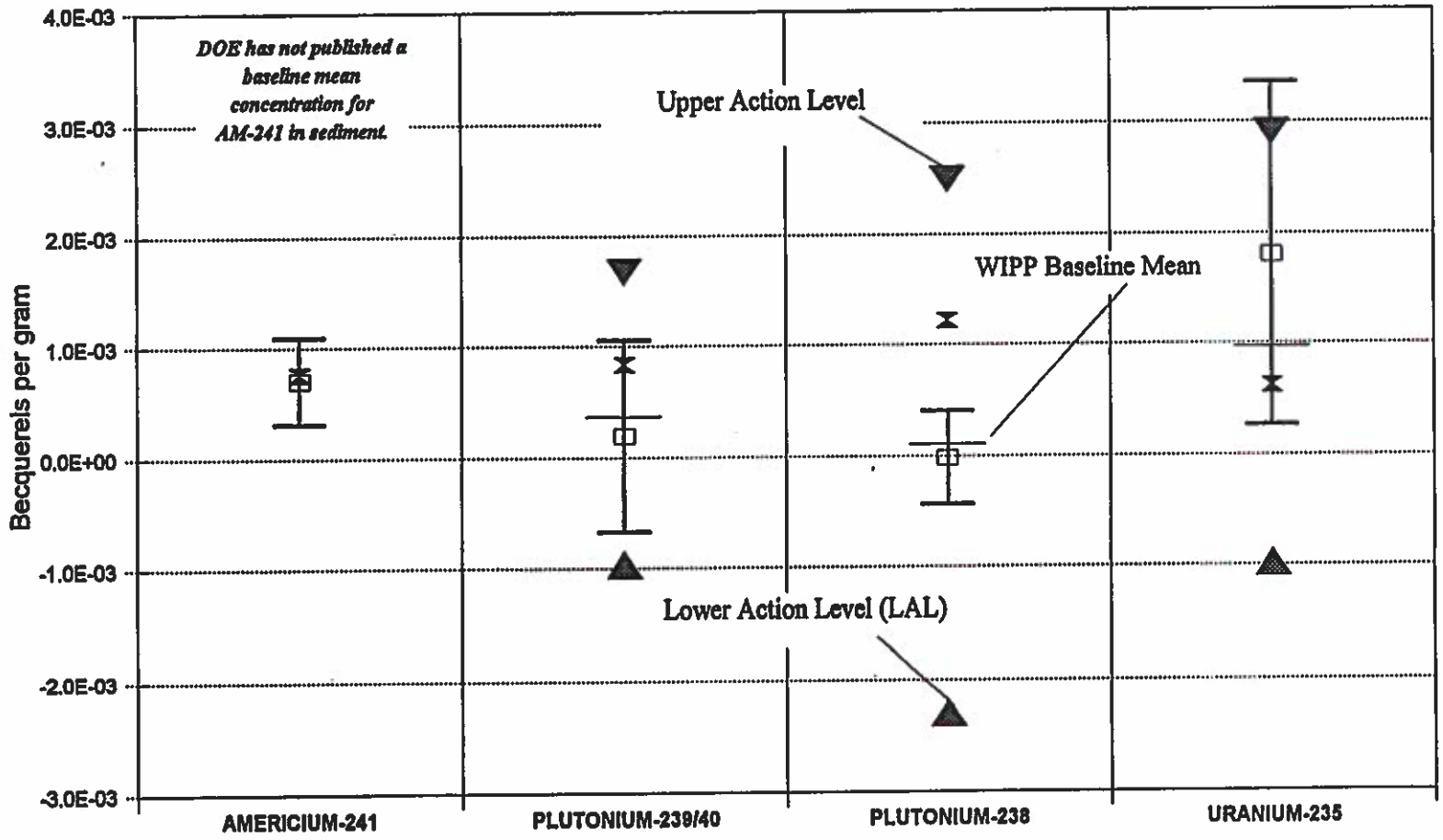
NMED 1995 Activity Range +/- Error

Minimum Detectable Activity

UAL = WIPP Baseline Mean plus 2 standard deviations.
LAL = WIPP Baseline Mean minus 2 standard deviations.

Graph SED-1
NMED/WIPP
Sediment 1995

NMED/WIPP 1995 SEDIMENT RADIOCHEMISTRY MEAN ACTIVITY - PECOS RIVER LOCATIONS



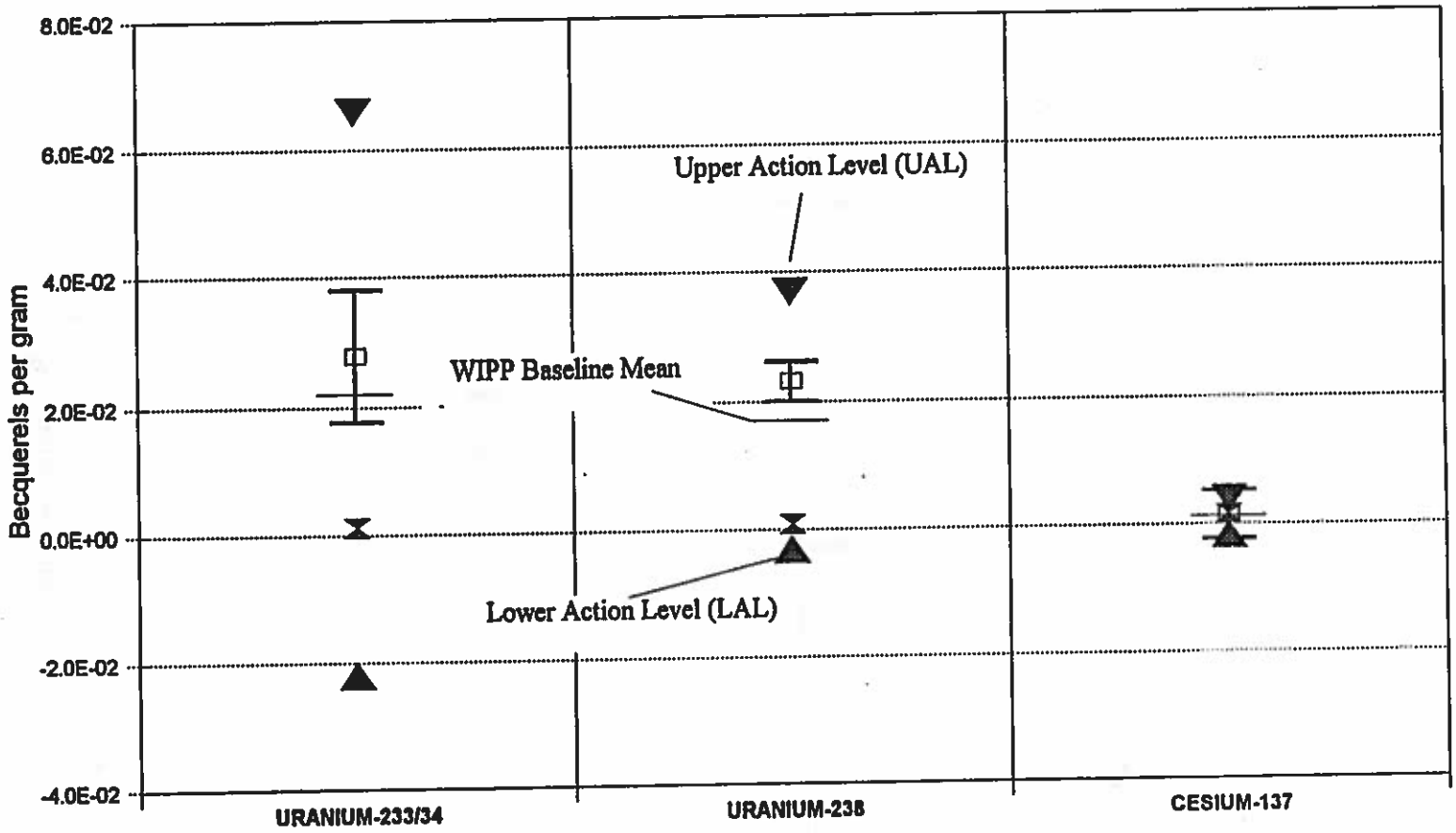
NMED 1995 Mean Conc.+/-2SD

Mean Minimum Detectable Activity

UAL = WIPP Baseline plus 2 standard deviations
LAL = WIPP Baseline minus 2 standard deviations

Graph SED-2
NMED/WIPP
Sediment 1995

NMED/WIPP 1995 SEDIMENT RADIOCHEMISTRY
MEAN ACTIVITY - PECOS RIVER LOCATIONS



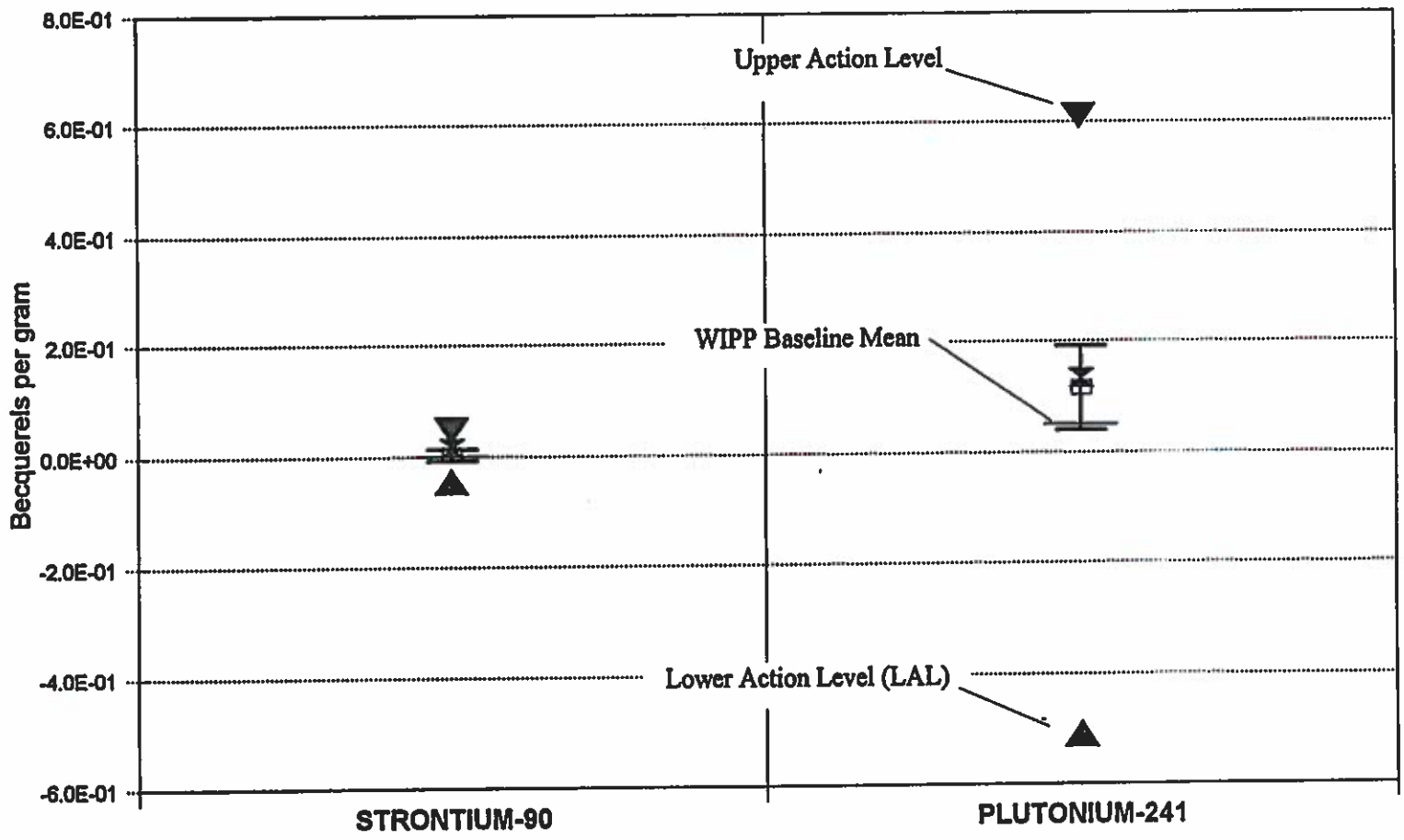
UAL = WIPP Baseline plus 2 standard deviations
LAL = WIPP Baseline minus 2 standard deviations

NMED 1995 Mean Activity +/- Std.Dev.

Mean Minimum Detectable Activity

Graph SED-3
NMED/WIPP
Sediment 1995

NMED/WIPP 1995 SEDIMENT RADIOCHEMISTRY
MEAN ACTIVITY - PECOS RIVER LOCATIONS

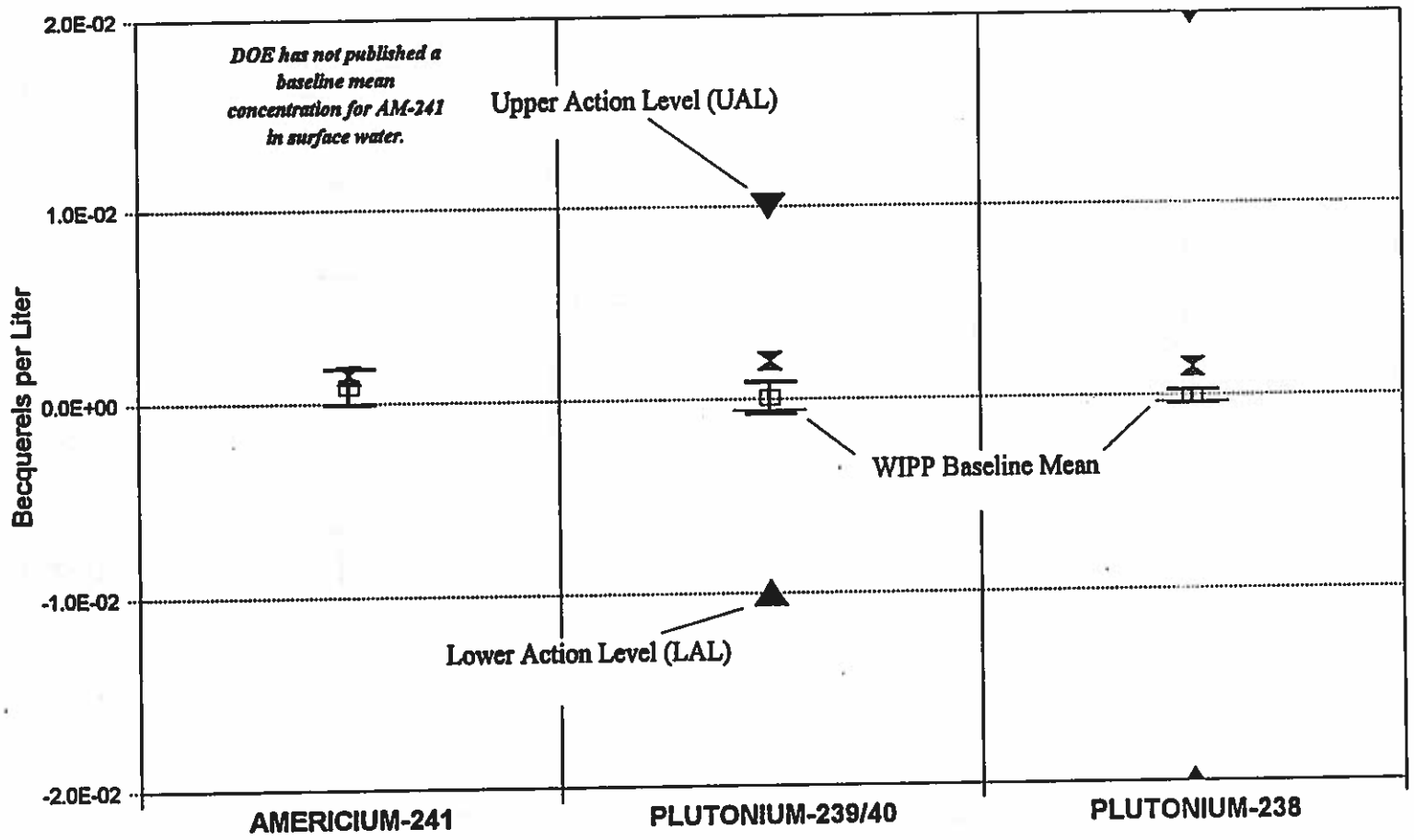


UAL = WIPP Baseline plus 2 standard deviations
LAL = WIPP Baseline minus 2 standard deviations

NMED 1995 Mean Activity +/- Std.Dev. Mean Minimum Detectable Activity

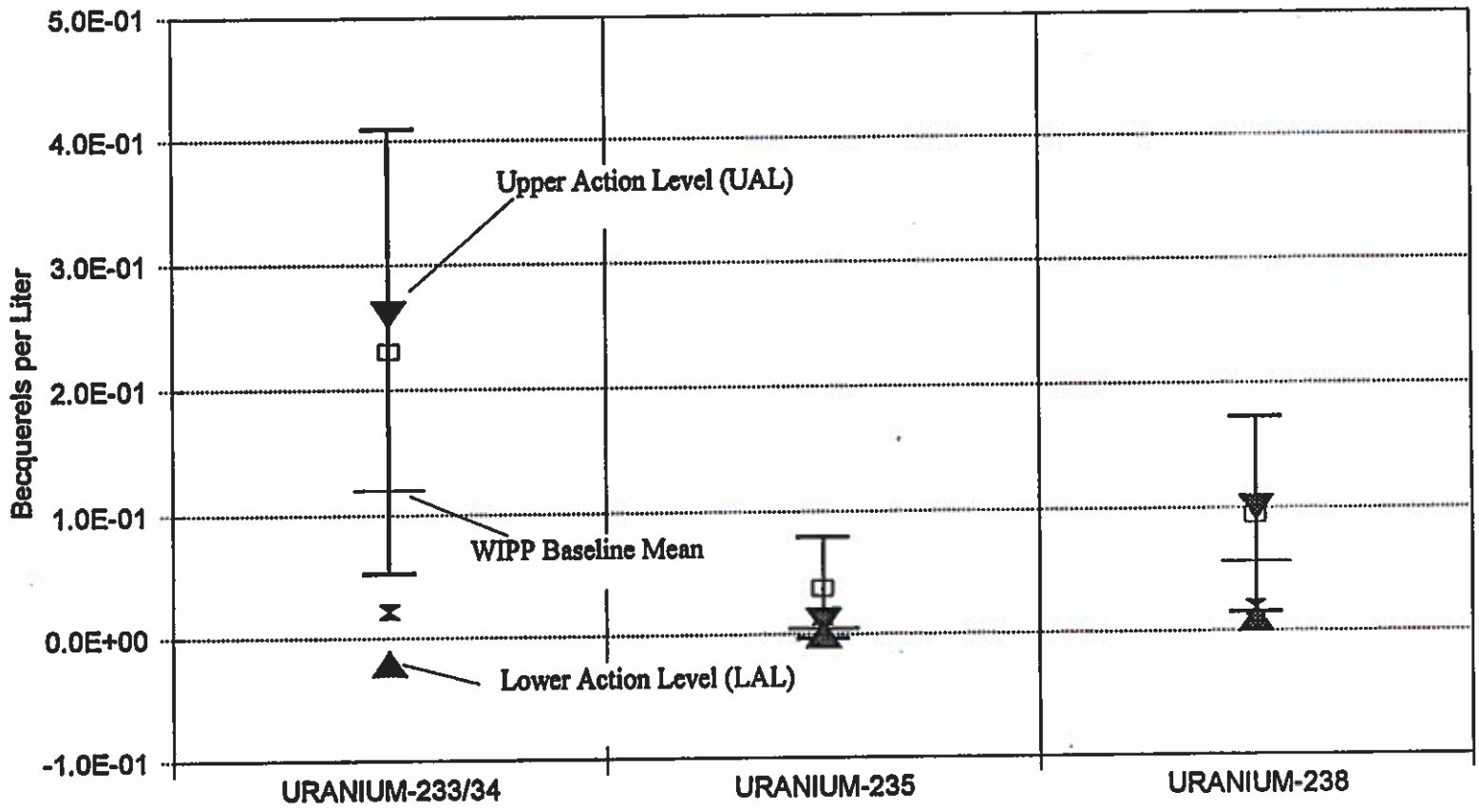
Graph SW-1
NMED/WIPP
Surface Water 1995

NMED/WIPP 1995 SURFACE WATER
MEAN ACTIVITY - PECOS RIVER LOCATIONS



Graph SW-2
NMED/WIPP
Surface Water 1995

NMED/WIPP 1995 SURFACE WATER
MEAN ACTIVITY - PECOS RIVER LOCATIONS



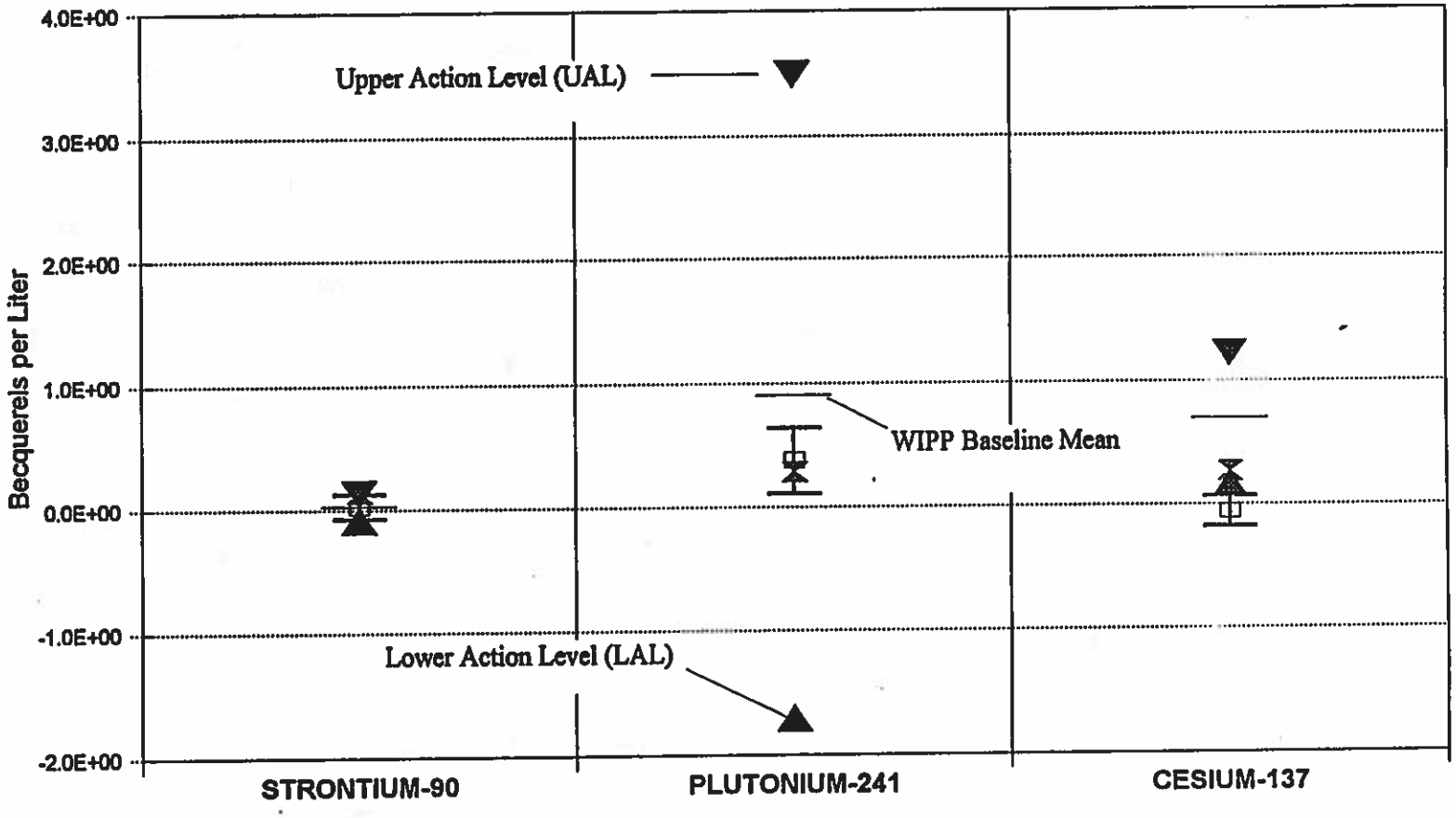
□ NMED 1995 Mean Conc. +/-2SD

⧗ Mean Miniumum Detectable Activity

UAL = WIPP Baseline plus 2 standard deviations
LAL = WIPP Baseline minus 2 standard deviations

Graph SW-3
NMED/WIPP
Surface Water 1995

NMED/WIPP 1995 SURFACE WATER
MEAN ACTIVITY - PECOS RIVER LOCATIONS



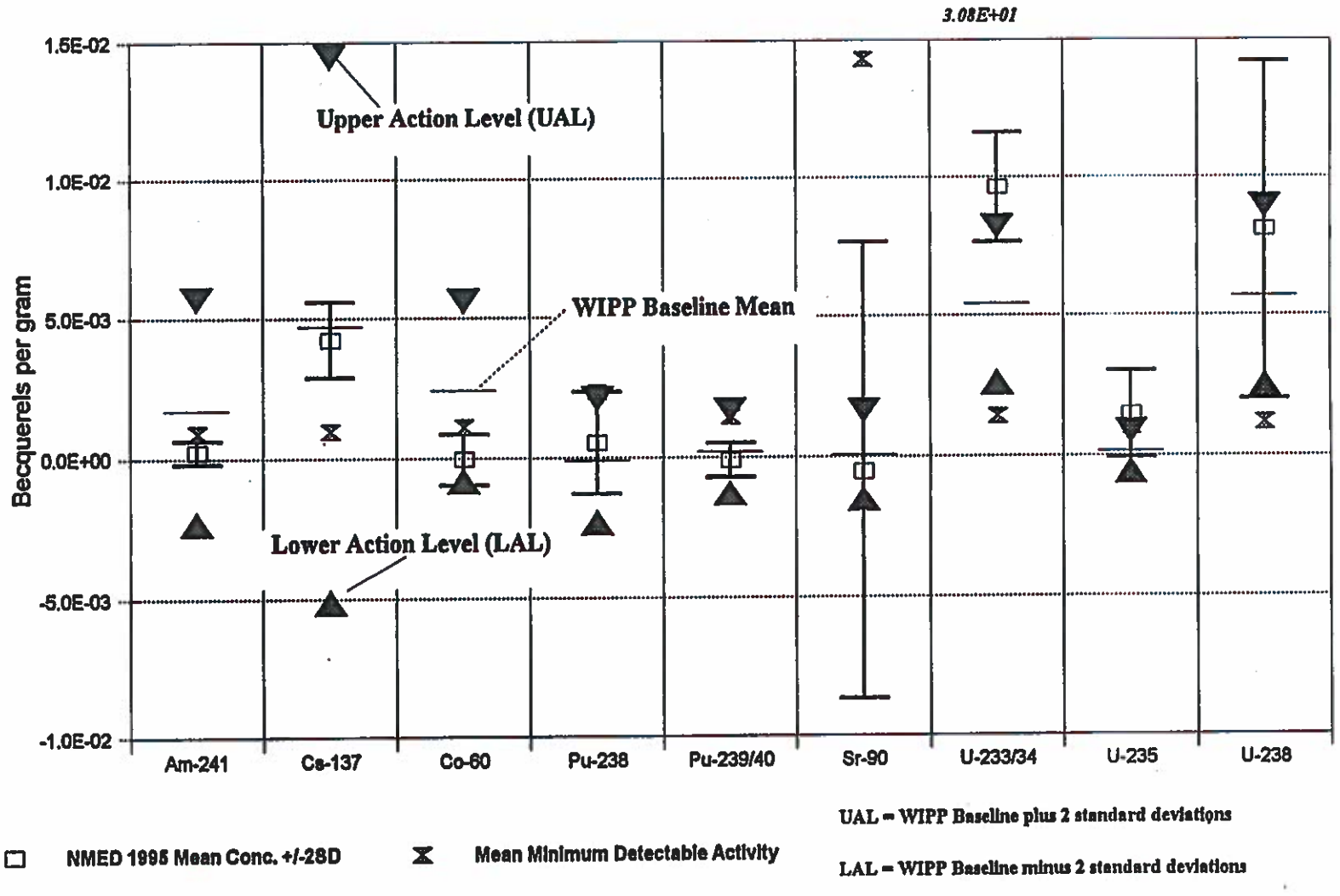
NMED 1995 Mean Conc. +/-2SD

Mean Minimum Detectable Activity

UAL = WIPP Baseline plus 2 standard deviations
LAL = WIPP Baseline minus 2 standard deviations

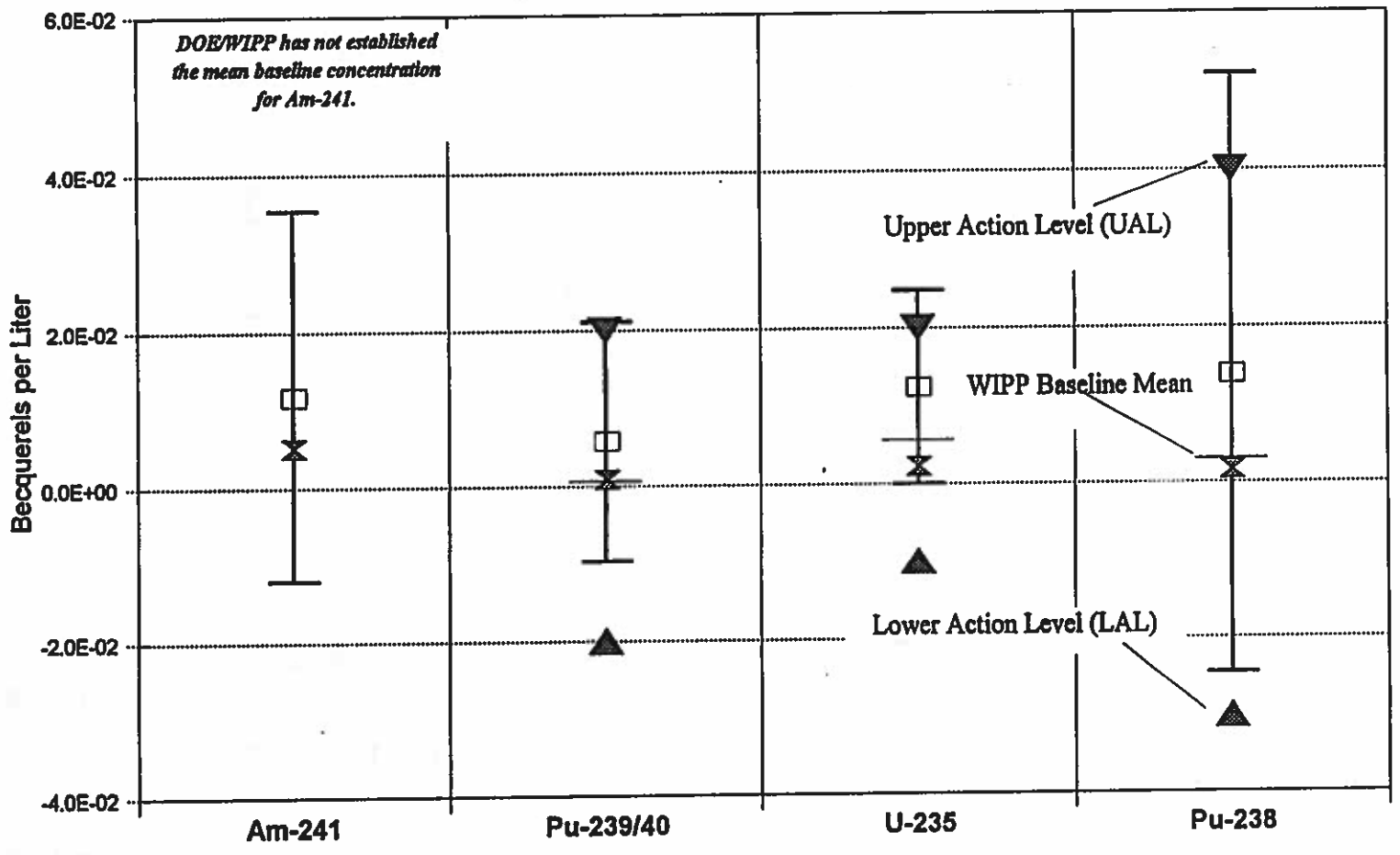
Graph SOIL-1
NMED/WIPP
SOIL 1995

NMED/WIPP 1995 SOIL RADIOCHEMISTRY
MEAN ACTIVITY of SELECTED ISOTOPES



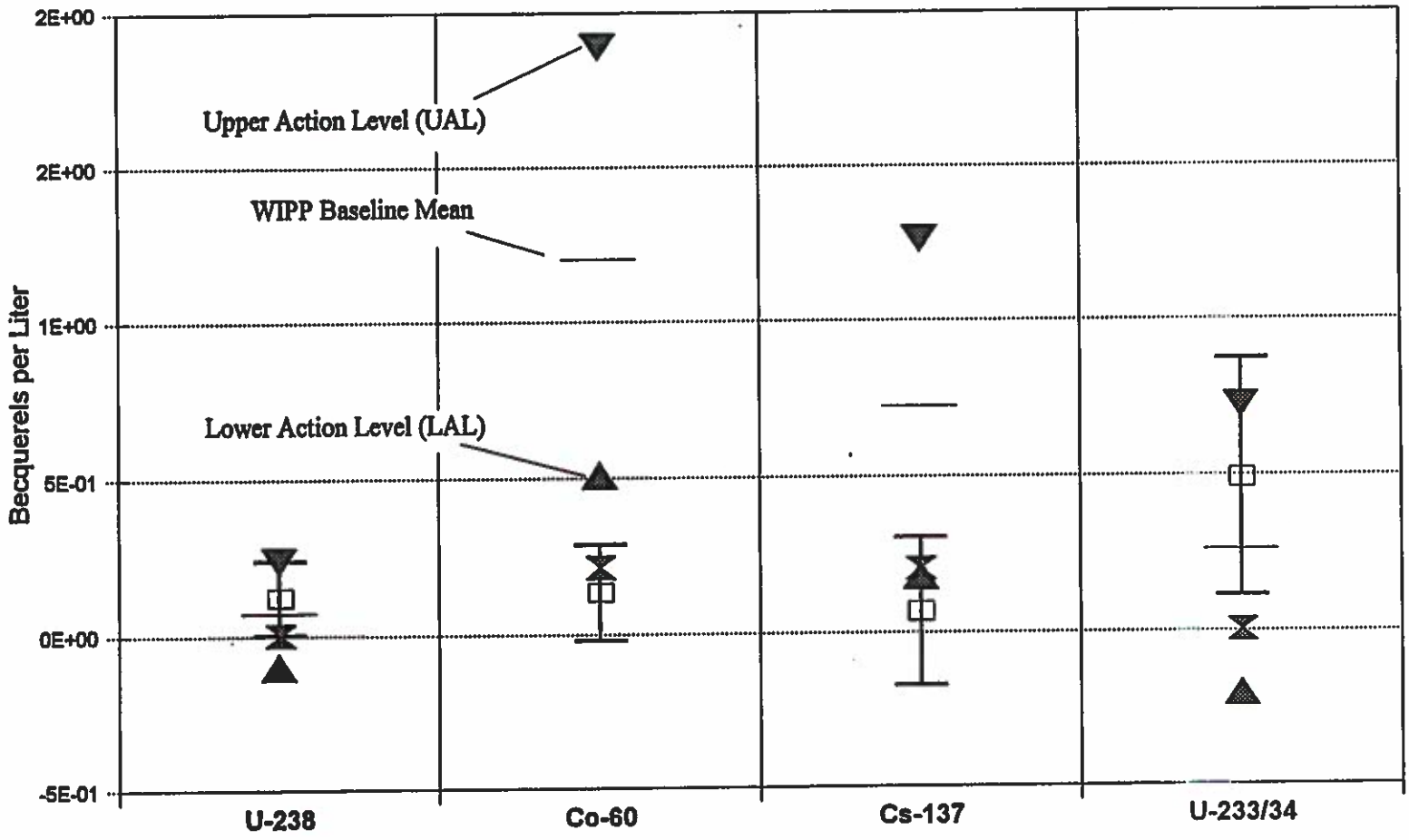
NMED/WIPP 1995 CULEBRA GROUND WATER
MEAN ACTIVITY of SELECTED ISOTOPES

Graph GW-1
NMED/WIPP
GROUND WATER 1995



Graph GW-2
NMED/WIPP
GROUND WATER 1995

NMED/WIPP 1995 CULEBRA GROUND WATER
MEAN ACTIVITY of SELECTED ISOTOPES



NMED 1995 Mean Activity +/-2SD

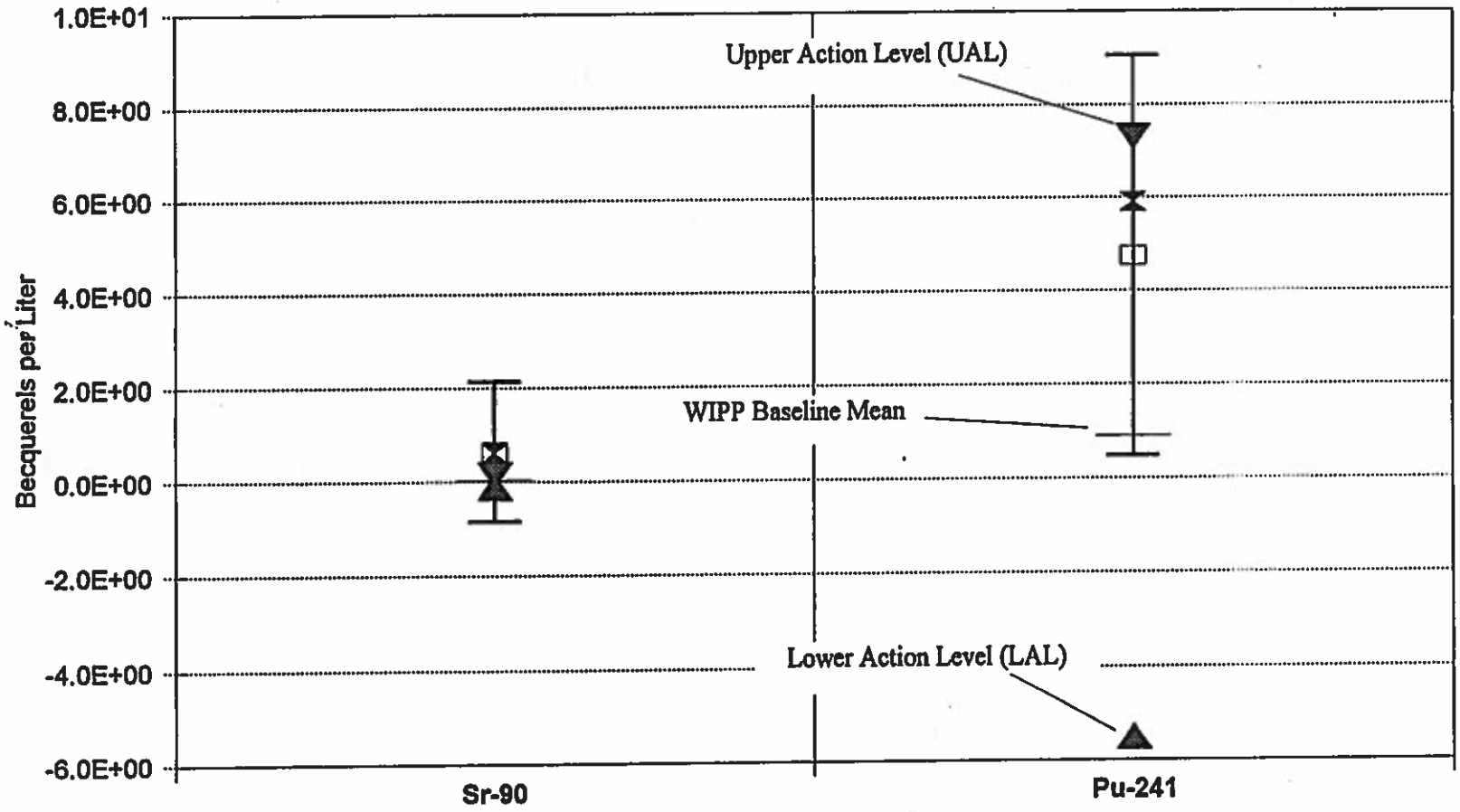
Mean Minimum Detectable Activity

UAL = WIPP Baseline plus 2 standard deviations

LAL = WIPP Baseline minus 2 standard deviations

NMED/WIPP 1995 CULEBRA GROUND WATER
MEAN ACTIVITY of SELECTED ISOTOPES

Graph GW-3
NMED/WIPP
GROUND WATER 1995



UAL = WIPP Baseline plus 2 standard deviations

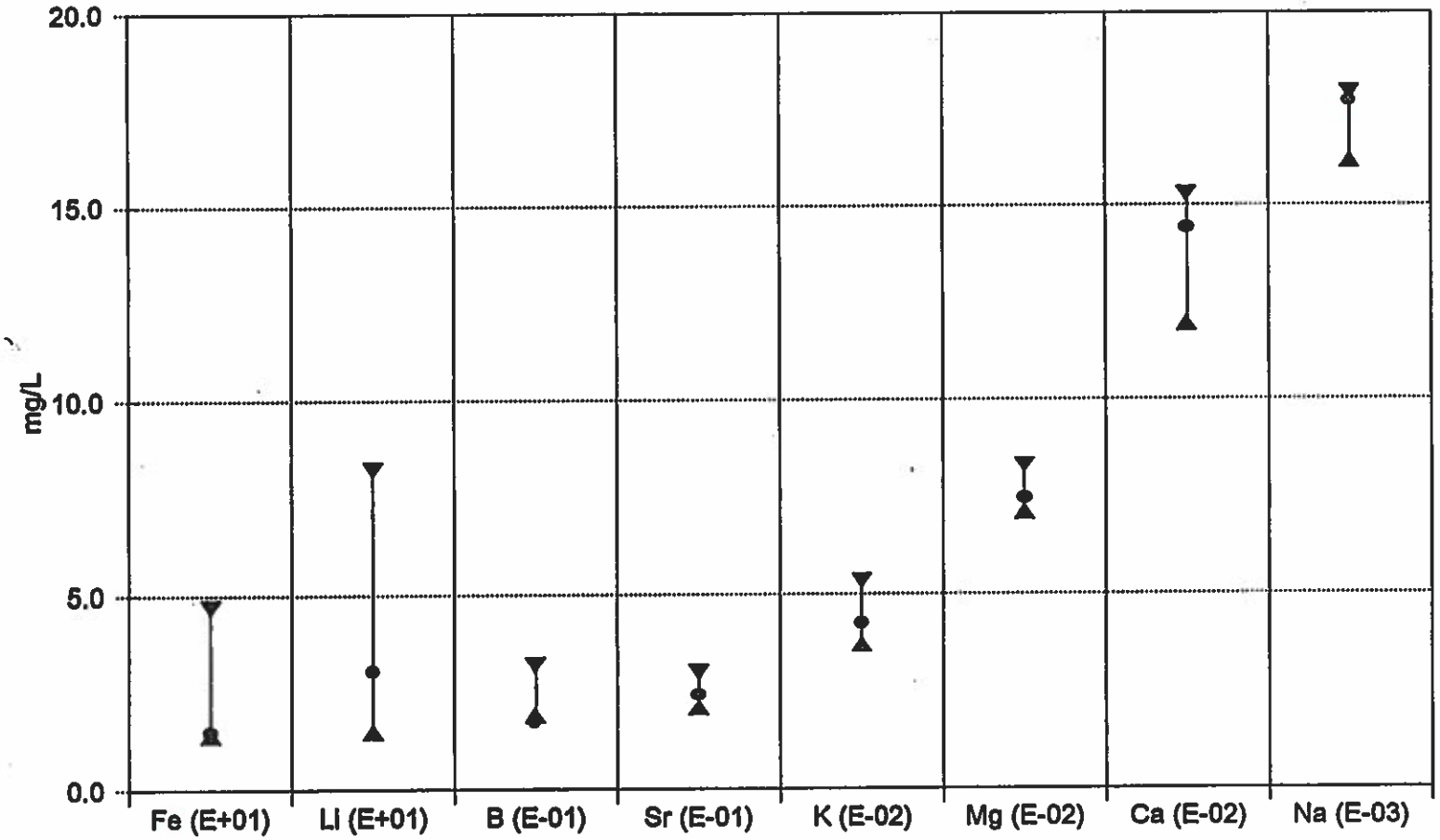
LAL = WIPP Baseline minus 2 standard deviations

NMED/WIPP GROUND WATER CHEMISTRY

Well H-03b3 Major Cations

NMED 1995 results vs. WIPP Background

Graph GW-4
NMED/WIPP
GROUND WATER 1995



▼ Upper 95% Confidence Interval ▲ Lower 95% Confidence Interval ● NMED 1995 Result

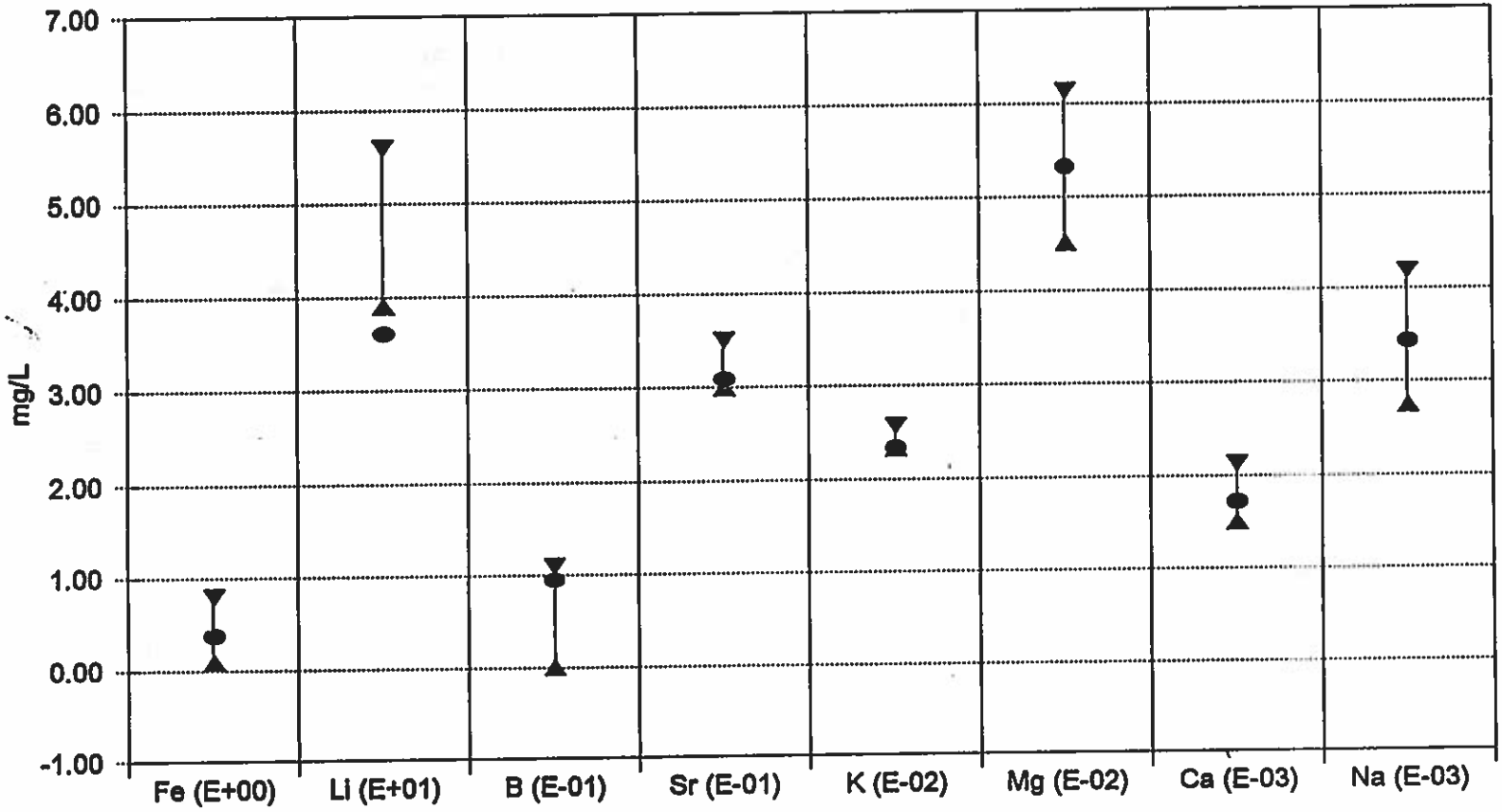
EPA Risk Based Concentrations
Fe = 11 mg/L
B = 3.3mg/L
Sr = 22 mg/L

Graph GW-5
NMED/WIPP
GROUND WATER 1995

NMED/WIPP GROUND WATER CHEMISTRY

Well H-14 Major Cations

NMED 1995 results vs. WIPP Background Range



▼ Upper 95% Confidence Interval ▲ Lower 95% Confidence Interval ● NMED 1995 Result

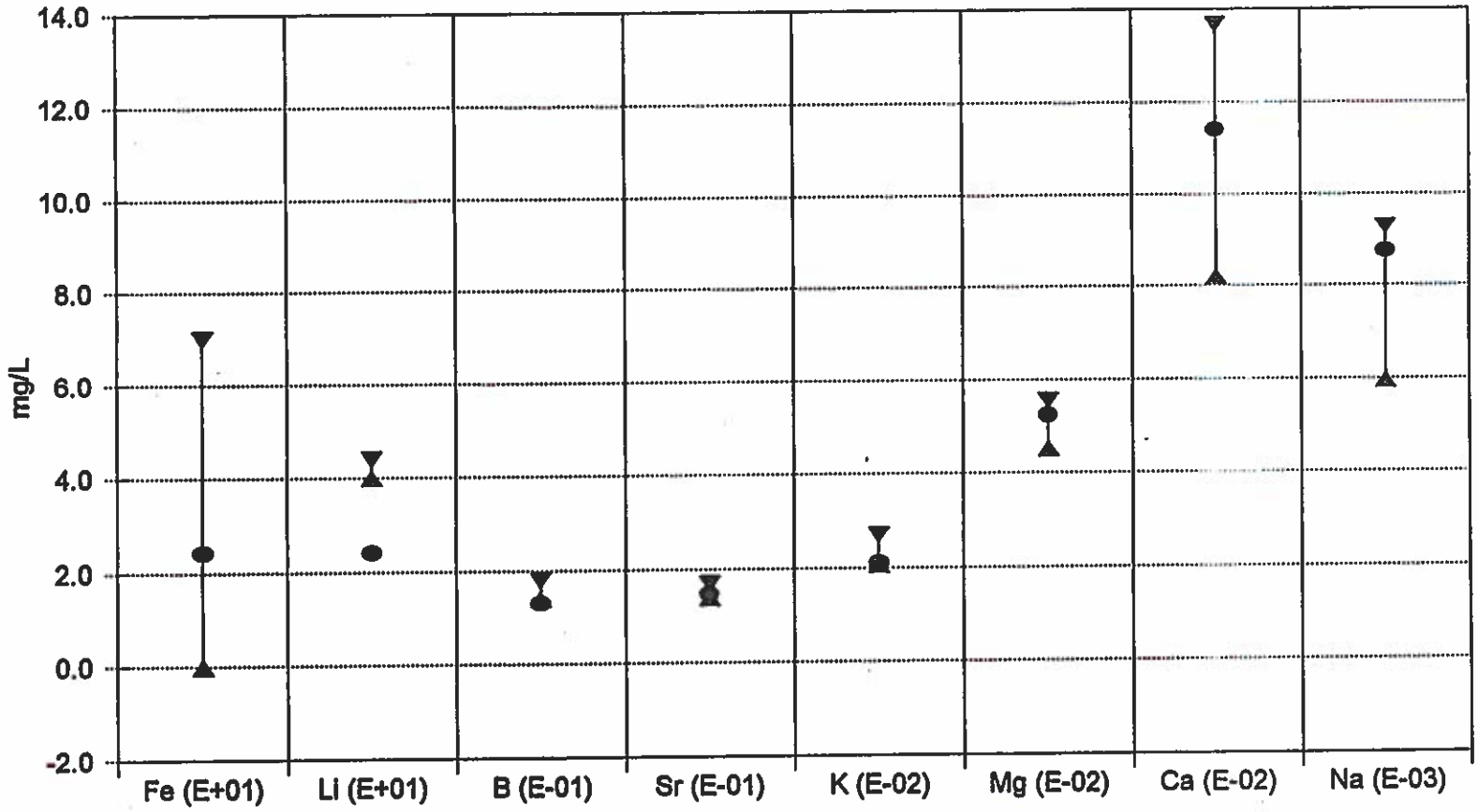
EPA Risk Based Concentrations
Fe = 11 mg/L
B = 3.3mg/L
Sr = 22 mg/L

Graph GW-6
NMED/WIPP
GROUNDWATER 1995

NMED/WIPP GROUND WATER CHEMISTRY

Well H-18 Major Cations

NMED 1995 Results vs. WIPP Background Range



▼ Upper 95% Confidence Interval ▲ Lower 95% Confidence Interval ● NMED 1995 Result

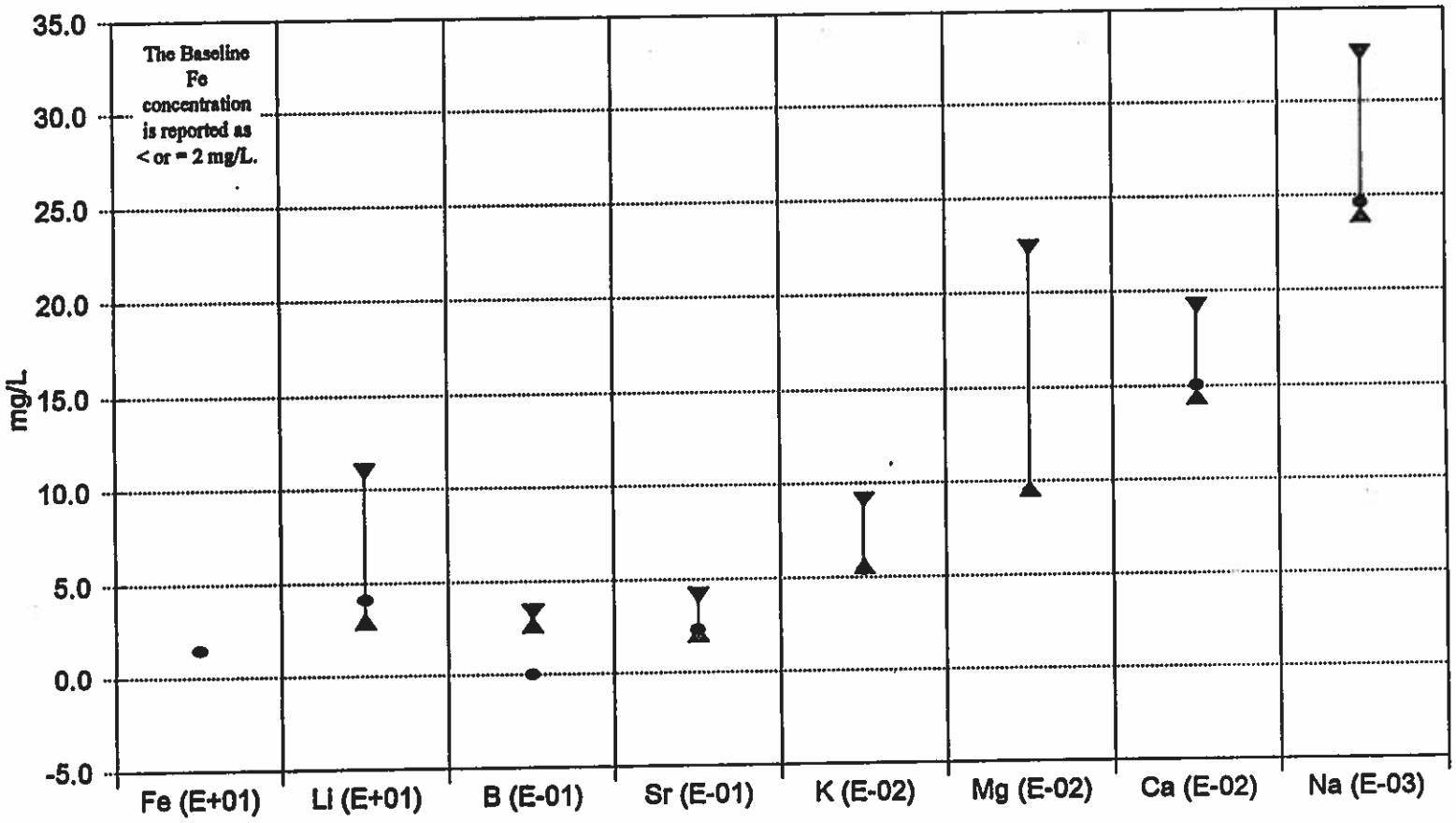
EPA Risk Based Concentrations
Fe = 11 mg/L
B = 3.3 mg/L
Sr = 22 mg/L

Graph GW-7
NMED/WIPP
GROUNDWATER 1995

NMED/WIPP GROUND WATER CHEMISTRY

Well WIPP-19 Major Cations

NMED 1995 Results vs. WIPP Background



▼ Upper 95% Confidence Interval ▲ Lower 95% Confidence Interval ● NMED 1995 Result (E)

EPA Risk Based Concentrations
Fe = 11 mg/L
B = 3.3 mg/L
Sr = 22 mg/L

APPENDIX III

Table-3

PROPOSED WIPP RADIONUCLIDE DISPOSAL INVENTORY

SOURCE : Waste Isolation Pilot Plant Transuranic Waste Baseline Inventory Report, CAO-94-1005, Revision 1, February 1995

NUCLIDE	UNITS	TOTAL CH*	% OF TOTAL CH	TOTAL RH**	% OF TOTAL RH	CH +RH	% OF TOTAL INVENTORY
AMERICIUM-241	Curies	223000.0	6.1944%	530.0	0.0251%	223530.0	3.9147%
COBALT-60	Curies	153.0	0.0043%	10800.0	0.5118%	10953.0	0.1918%
CESIUM-137	Curies	5320.0	0.1478%	328000.0	15.5450%	333320.0	5.8375%
PLUTONIUM-238	Curies	1890000.0	52.5000%	3530.0	0.1673%	1893530.0	33.1616%
PLUTONIUM-239/240	Curies	457200.0	12.7000%	6584.0	0.3120%	463784.0	8.1223%
PLUTONIUM-241	Curies	1010000.0	28.0556%	906.0	0.0429%	1010906.0	17.7041%
STRONTIUM-90	Curies	4070.0	0.1131%	668000.0	31.6588%	672070.0	11.7701%
URANIUM-233/234	Curies	1630.0	0.0453%	857.0	0.0406%	2487.0	0.0436%
URANIUM-235	Curies	2.9	0.0001%	5.7	0.0003%	8.5	0.0001%
URANIUM-238	Curies	18.8	0.0005%	13.1	0.0006%	31.9	0.0006%
TOTAL INVENTORY	Curies	3600000.0	99.7610%	2110000.0	48.305%	5710000.0	80.7464%

CH* - Contact Handled TRU-waste

RH* - Remote Handled TRU-waste

APPENDIX IV

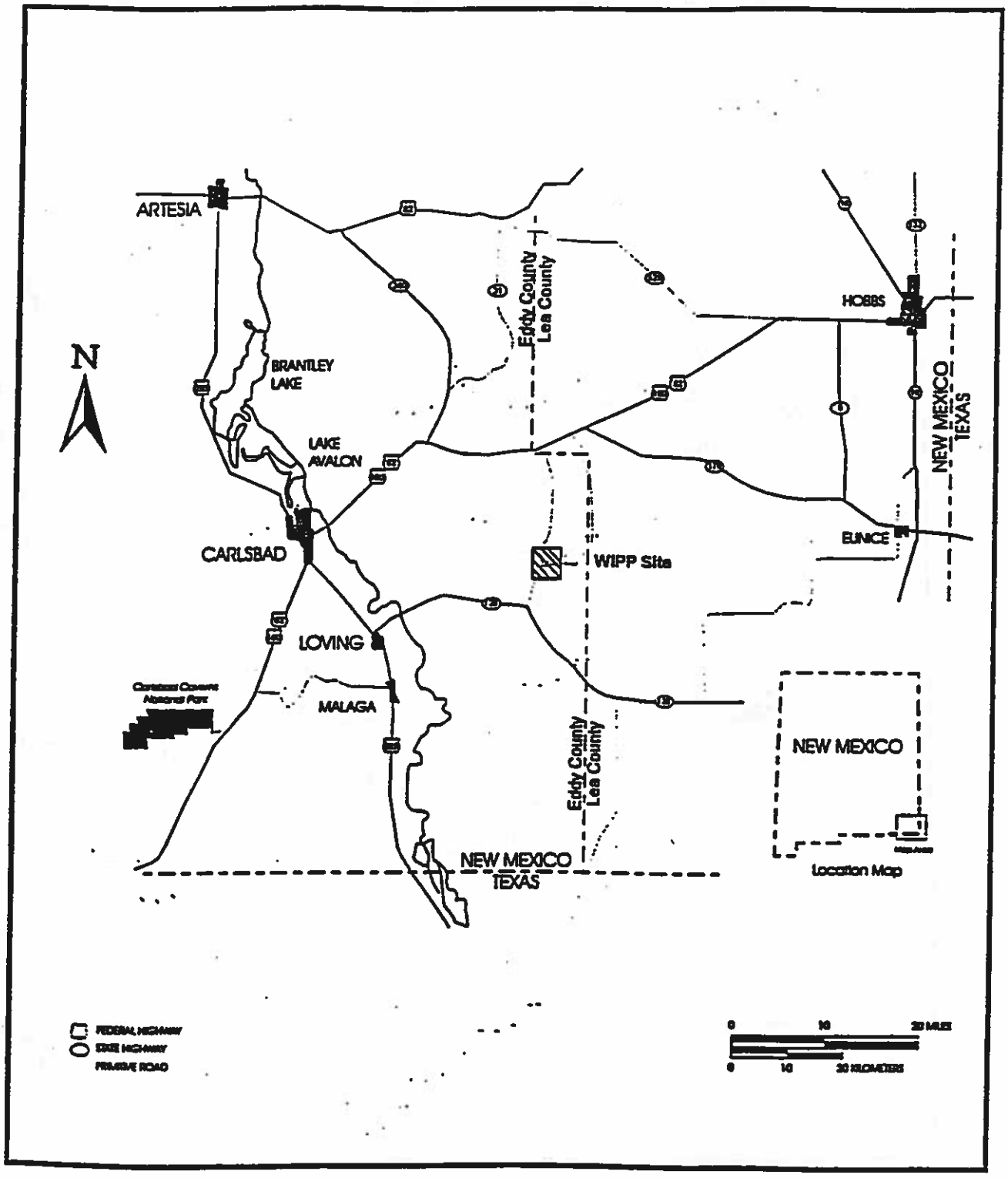


Figure 1 WIPP Location in Southeastern New Mexico

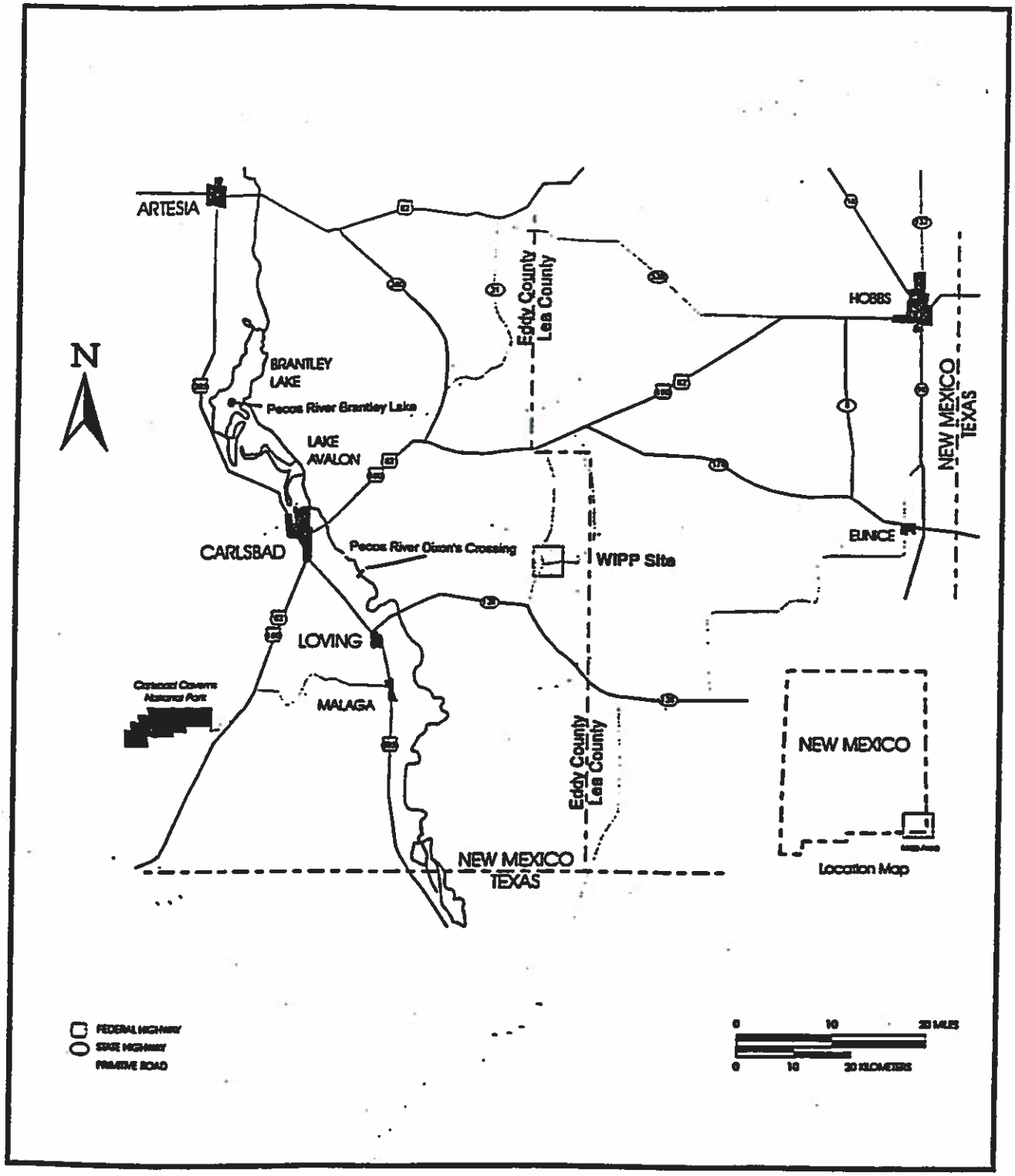


Figure 2 Biotic Tissue sample locations: Catfish

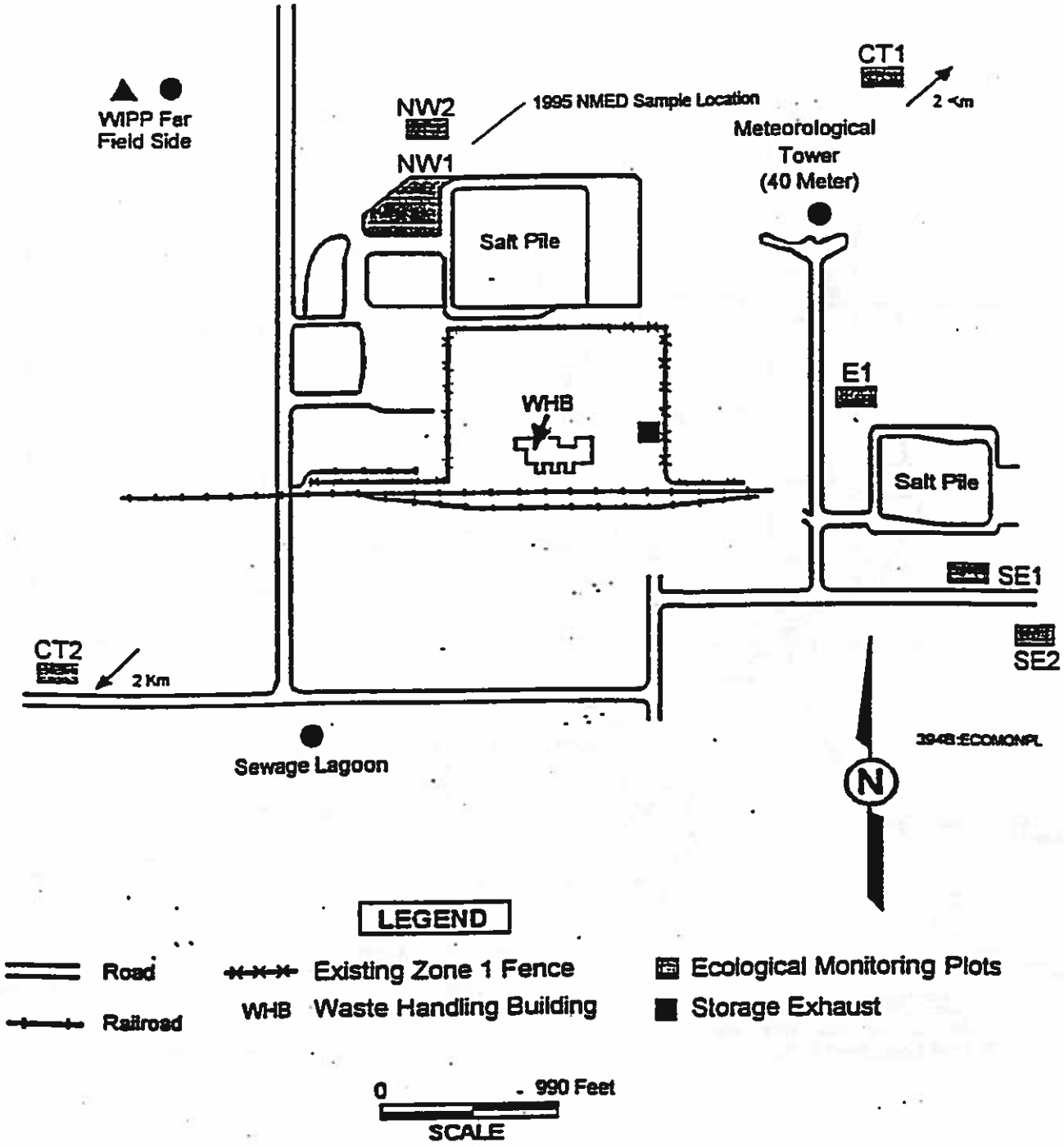


Figure 3 Biotic Tissue sample locations: Vegetation

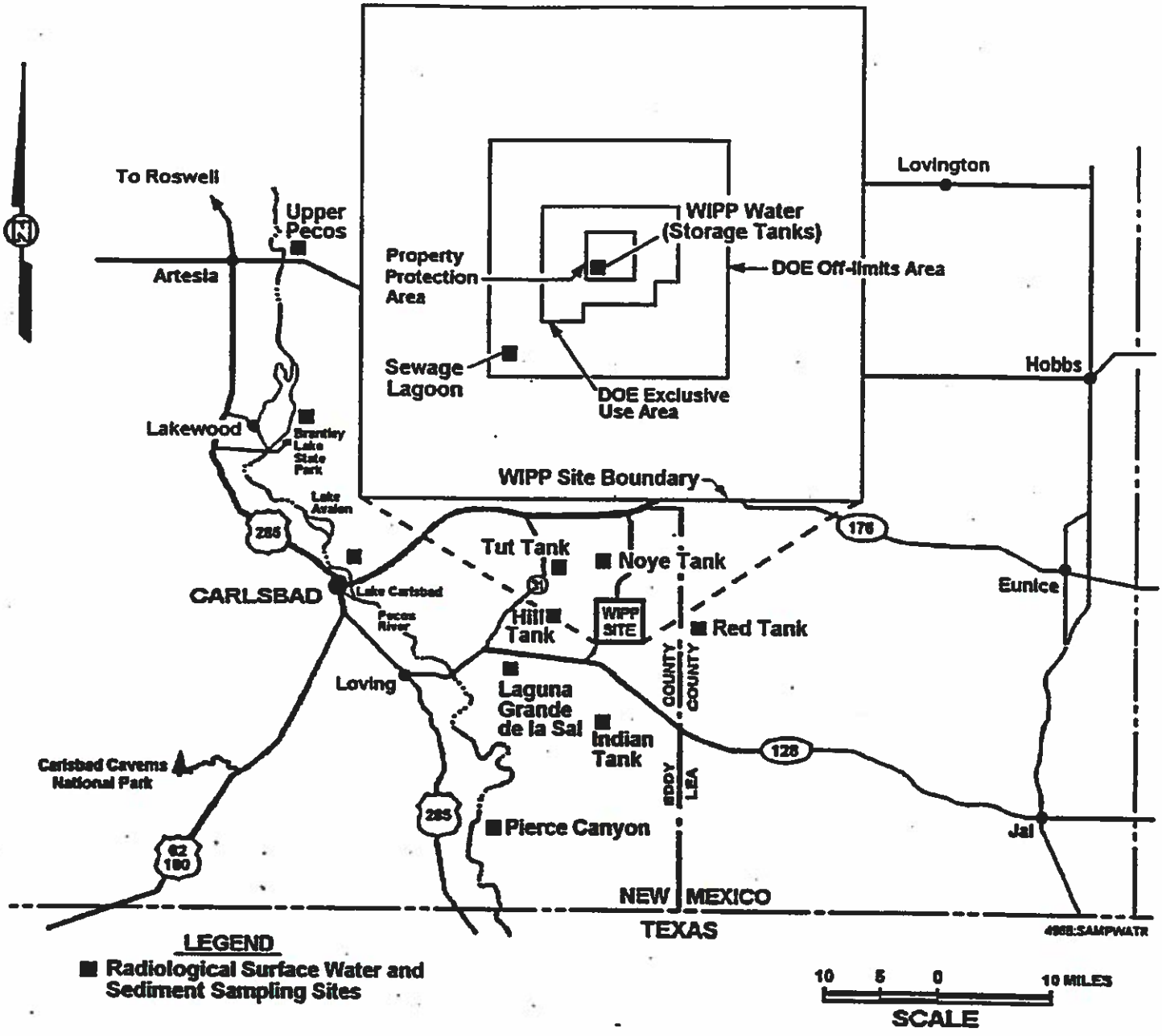


Figure 4 Sediment and Surface water Sample locations

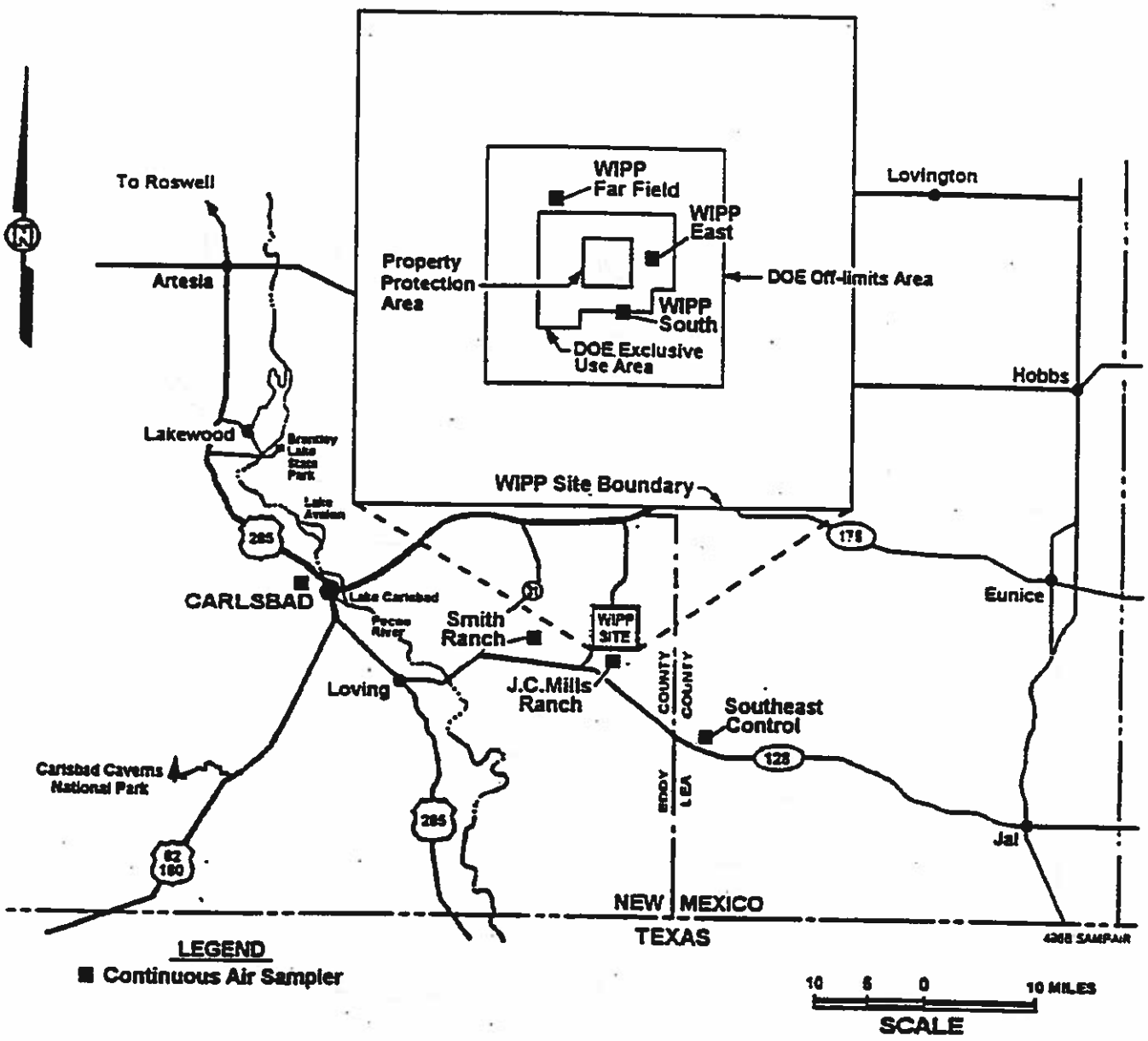


Figure 5 Soil Sample locations

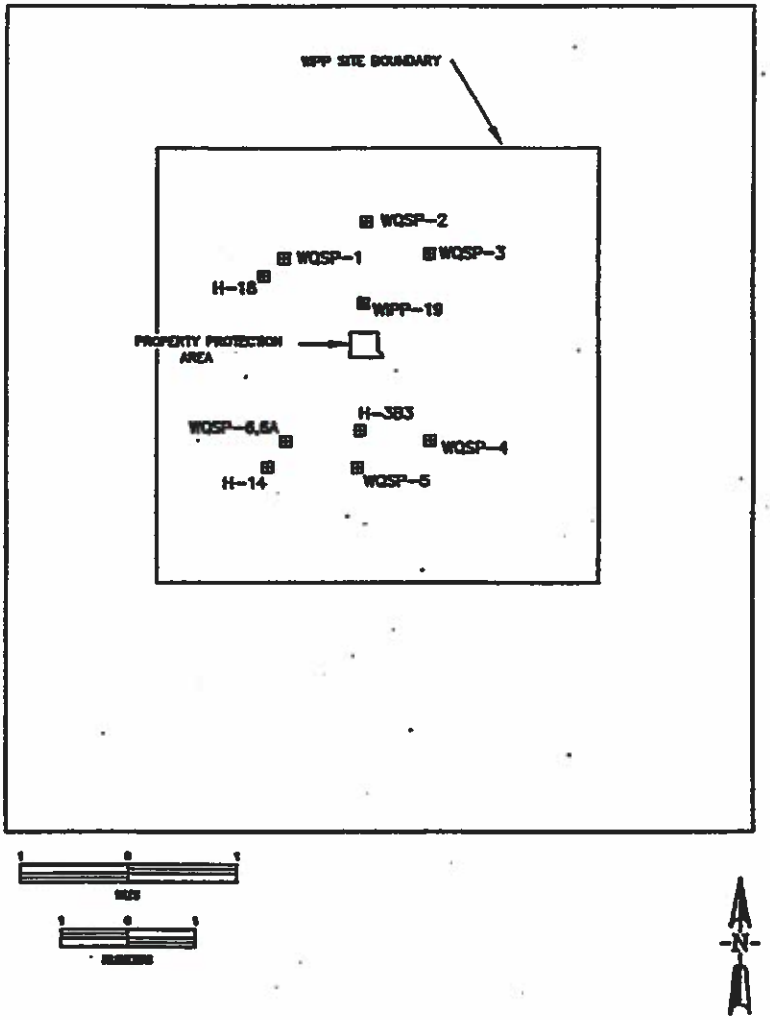


Figure 6 Ground water sample locations